VOL. XXVI. No. 3.

MARCH 1941

MECCANO MAGAZINE

A MIDLAND COMPOUND

6D.

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With the Editor

An Engineer who Helped Meccano

The death on 30th January, at the age of 86, of Dr. Hele-Shaw, F.R.S., brought to a close a long career of brilliant work in scientific research, the development of inventions and the training of engineers. In the world of Meccano boys, however, Dr. Hele-Shaw held a place of very special importance, for he was the first prominent engineer to realise the enormous possibilities of Meccano as a constructional toy. At that time he was Professor of Engineering at University College, Liverpool.

The late Frank Hornby was then in the early throes of developing his invention, and seemed to be making little or no headway. He approached one firm after another with a view to their manufacturing and marketing the toy, but nobody was interested. He then had the happy notion of submitting his ideas to Dr. Hele-Shaw, and the latter promptly gave his opinion that the scheme was based on sound engineering principles, and that it should have unbounded success as a constructional toy. The letter to Frank Hornby in which he expressed his view was largely instrumental in securing the financial assistance necessary to launch Meccano on its unique career.

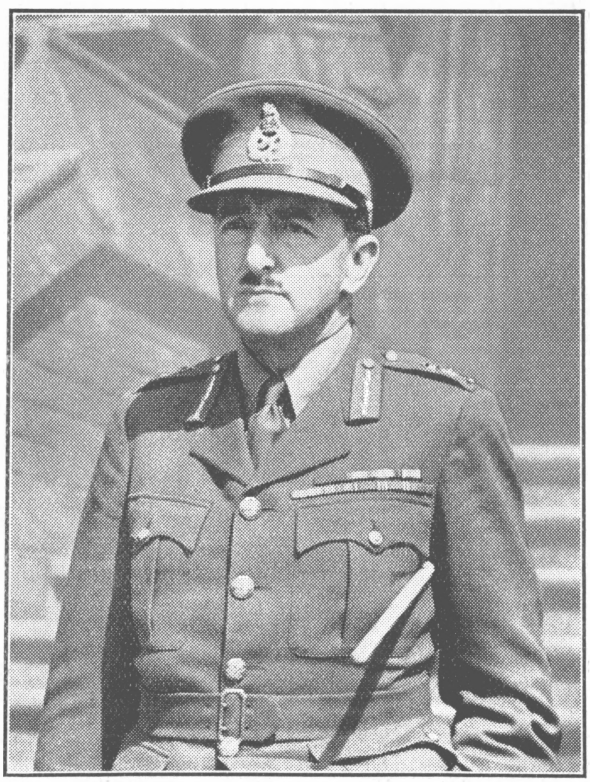
At a later date I shall hope to give some account of the remarkable range of inventions produced by Dr. Hele-Shaw. I did not make his personal acquaintance until about 1935, but since that time I have spent some happy hours with him in his office in Westminster. Even at his then great age he was a man of extraordinary vitality and personality. He had a remarkable memory, and it was an unforgettable experience to listen to him describing, as if it were yesterday, his personal contacts with famous men whose names to me were already almost legendary.

* * * *

The *"Meccano Magazine"* R.A.F. Radio Fund has now reached a total of over £140, of which £130 has already been forwarded to the R.A.F. Comforts Committee.

Leaders in the War
XVI.—Sir Alan Brooke

General Sir Alan Francis Brooke is an Ulsterman, although he was born in France, in 1883, and was educated abroad. After passing through the Royal Military Academy, Woolwich, he joined the Royal Field Artillery in 1902, and served the first four years of his military career in the south of Ireland. In 1906 he was transferred to India, and three years later was posted to the Royal Horse Artillery.



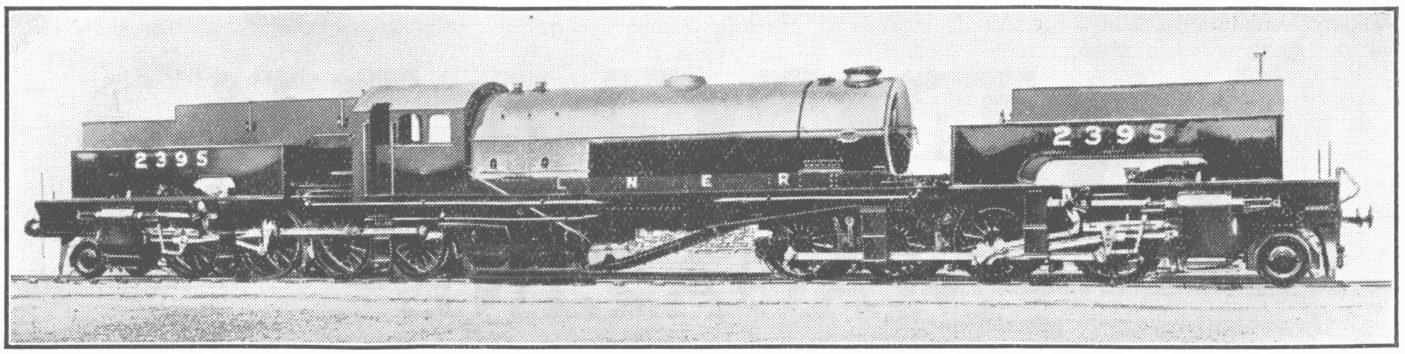
General Sir Alan Francis Brooke, K.C.B., C.B., D.S.O., Commander-in-Chief, Home Forces.

He began his service in the war of 1914-18 by landing in France in September 1914 with the first Indian contingent, in command of an ammunition column of the Secunderabad Cavalry Brigade. He achieved many successes with his courageous Indian troops, and in 1917 was awarded the D.S.O. He was mentioned in dispatches six times.

After the war he specialised in artillery, and held successively the responsible appointments of Commandant of the School of Artillery, Inspector of Artillery, and Director of Military Training, War Office. Shortly before the crisis of 1938 he became Chief of the Anti-Aircraft Corps. A year later he was promoted to the Southern Command. Then war broke out and he was given command of the Second Army Corps of the British Expeditionary Force in France, and he was knighted for his services in that capacity and for his brilliant work in connection with the Dunkirk evacuation.

Soon after the close of the campaign in France Sir Alan was appointed Commander-in-Chief, Home Forces, to organise the defence of Great Britain against Nazi invasion.

Like many other great soldiers Sir Alan Brooke has hobbies that are far from warlike. He is particularly keen on the photography of animal life in its natural haunts, and has produced some remarkably interesting films with his cine-camara. Fishing is another hobby with which, in times of peace, he has secured many hours of quiet happiness and rest.



L.N.E.R. "Garratt" 2-8-0 + 0-8-2 No. 2395, Britain's most powerful locomotive.

The "Banking" of Trains up Steep Inclines

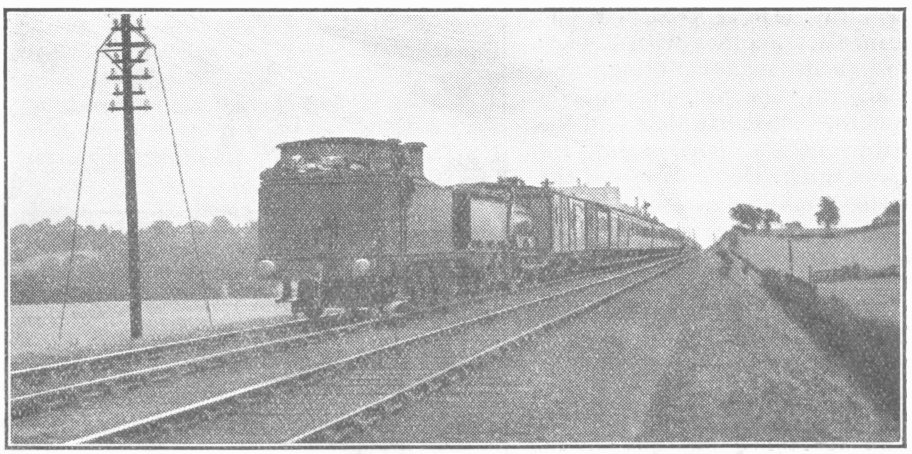
Safety Precautions in British Practice

By D. S. Barrie

IF there is one special feature of railway working which reveals the locomotive in its most spectacular mood it is surely the "banking" of trains up a steep incline—especially at the moment of climax when the assisting engine, its work accomplished, gives a final triumphant blast of its exhaust and then quietly drops behind to let the train roll with ever-increasing speed "over the top" and away on its journey.

Witnessed perhaps at the crest of a bleak Highland pass, with the smoke trails of the engines drifting away against a background of snow-clad hills, the sight of a heavy train breasting the summit with locomotives fore and aft is picturesque enough to the layman, but far from inspiring to the railway official who sees coal being burned at an excessive rate in order to lift 400 tons of coaches up a 10-mile gradient, and in all probability at no higher speed than 20 or 30 m.p.h.! Hence, with the advent of large numbers of powerful locomotives of standardised designs, and with the more scientific use of locomotive power thereby made possible, the reduction, and in some cases even the elimination of intermediate "banking," has figured largely among the extensive locomotive economies achieved by the British railways.

Gradients of such severity as to warrant the use of a special engine being attached, either in front of the train engine or in rear of the train, for the purpose of surmounting a particular "bank," may not appear at first thought to be very numerous. This is because the number of instances where it occurs with passenger trains is extremely small relative to the total British mileage; some of these instances, such as the Lickey and Beattock Inclines on the L.M.S., are of course well known to everybody interested in railways. Much more extensive provision has to be made, however, for assisting freight trains in rear, and for a variety of reasons—to prevent the trains being unduly long in the section, with resultant loss of line capacity; to prevent risk of the train engine being overmastered by its load on a slippery rail, and running back (that is to say, with freight trains not continuously braked); or to prevent having to divide the load with one engine. The last-named practice was in the past an everyday occurrence on mountainous railways on the American continent, and was known as "doubling a hill." Assisting locomotives are termed "helper engines" in America, where their services are in much greater demand than in this country, owing to the heavier loads and stiffer gradients. On some of the heaviest grades it is not unknown for American freight trains to take one or two engines in front, one in the centre, and another behind the caboose.



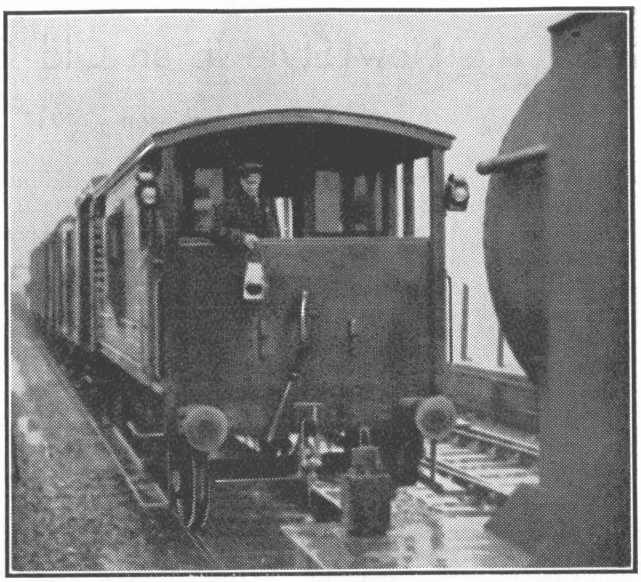
Three engines to a train. A pre-grouping photograph of a Midland express ascending the Lickey Incline, 1 in 37.

Compared with front-end piloting, rear-end assistance is a sufficiently rare practice in this country, and its use is governed by such meticulous precautions to ensure safety that, except in emergency, it is never employed "except where specially authorised." The sections on which it may be practised are invariably specified in the working time-tables or their appendices, and where banking is optional the operating staff are also furnished with tables showing the maximum loads, in terms of tonnage and/or numbers of wagons (certain types of heavy vehicles

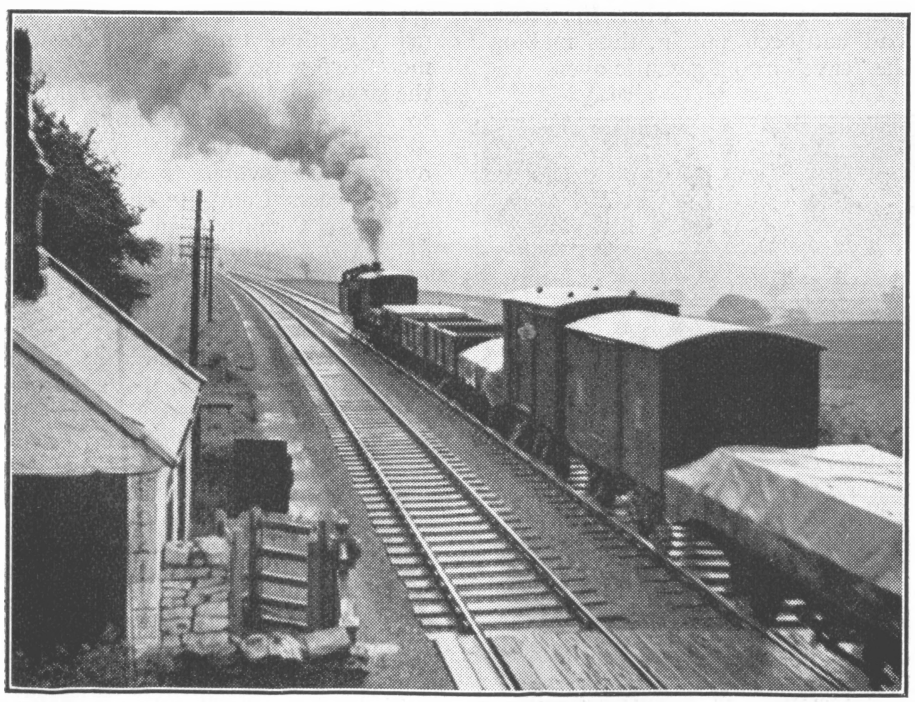
being reckoned as 1½, 2 or 3 for this purpose) with which any one engine of each class will be allowed to tackle the gradient without assistance. An interesting illustration of the strict limits within which rear-end banking is confined in this country is that on one railway there are 450 sections of line, mostly very short, where it is permitted, and in only 60 or so of these cases does the authority extend to passenger as well as goods trains.

Safe and proper working of banked trains is governed not only by certain of the general rules common to all home railways, but also by specific "Local Instructions" applicable to each particular section. As a general practice, trains which are to receive assistance in rear must come to a stand before the banking engine closes up gently to the last vehicle; the train does not then resume its journey until the guard has given the "right-away" to the driver of the rear engine, and the latter has exchanged two "crow" whistle signals with the driver of the train engine. The train engine driver does not, of course, give his "double crow" until he is satisfied that the fixed signals are off for the train to proceed. Should it become necessary to stop the train when running with bank engine in rear, three or more short, sharp whistles, or a special "brake whistle" where prescribed, are used by either driver as an intimation to stop. When passenger or other trains of coaching stock are being assisted in rear, and it is required that the banker should be coupled to the train, this must not be done without the continuous brake being connected on *both* engines, the brake then being under control of the train engine driver. Banking engines in rear are always coupled to a train where the section includes any break, however slightly downhill, in the upward gradient.

Special regulations also govern the carrying of lights by trains assisted by one or more engines in rear. In all cases the train—or pilot-engine—continues to carry the ordinary code denoting the train's class, while the engine in rear (or the leading "banker" should two be used) carries one white light. When a goods train is assisted in rear the guard must remove the brake-van tail lamp as soon as the banker comes on, replacing it when the assistant engine drops off. As a general rule banking engines must not leave their trains except at a signal-box. Should it be necessary for any special reason for the bank engine to drop off between boxes, the guard must not replace the tail lamp until his train has passed out of sight of the signalman at the next box, at the same time making every endeavour to intimate to the signalman that the assisting engine is still in the section. The object of these precautions is of course to prevent a banking engine which has left its train between boxes, through breakdown or other cause, from being left in the section and another train admitted into that section.



"Over the Top."—Perched on the banking engine, an enterprising L.M.S. photographer secured this unusual picture just as the freight train began to draw away on passing the summit. The guard is replacing the tail-lamp, for the reasons described in the accompanying article.



A freight train battling its way through rainstorms on the most exposed section of a famous North Country incline. The engine is an L.M.S. standard "Class 3" 0-6-0T.

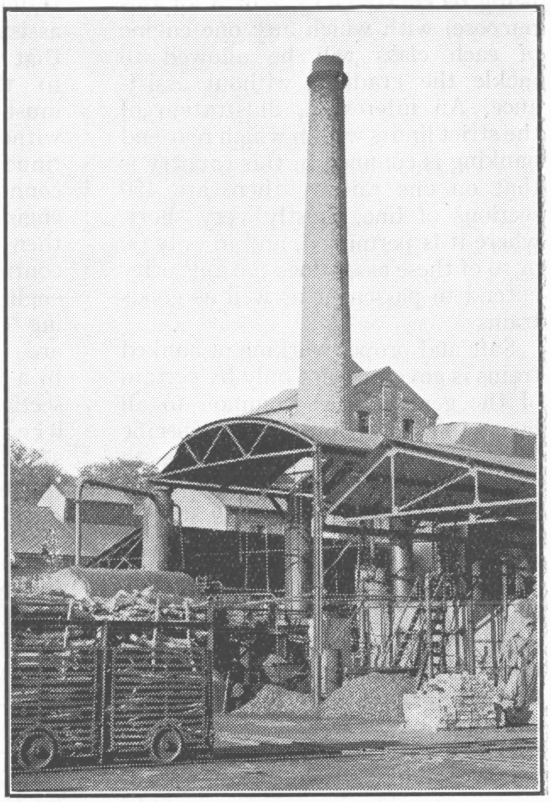
At places where banking engines are regularly attached or detached, special signals are often employed to control their movements into and out of the sidings. At certain passenger termini where passenger trains are frequently assisted out by the engines which have brought in the empty coaches, special signals may be seen, located an engine-length or two from the buffer stops. These are used to indicate that when the train starts the rear engine may assist it as far as a point stipulated in the local instructions; but if the train is ready to leave and the starting signals are off, but not the special "banking" signal, the rear engine must remain behind until the train has left and the special signal afterwards lowered.

Incidentally, there are many misapprehensions about the banking of trains out of some British stations having very steep gradients right off the platform ends, as with the 1 in 70 Camden Incline out of Euston. In this and other instances the engine which has brought (Continued on page 106)

Modern Charcoal Burning

The New Style in an Old Craft

By A. S. Jenkinson



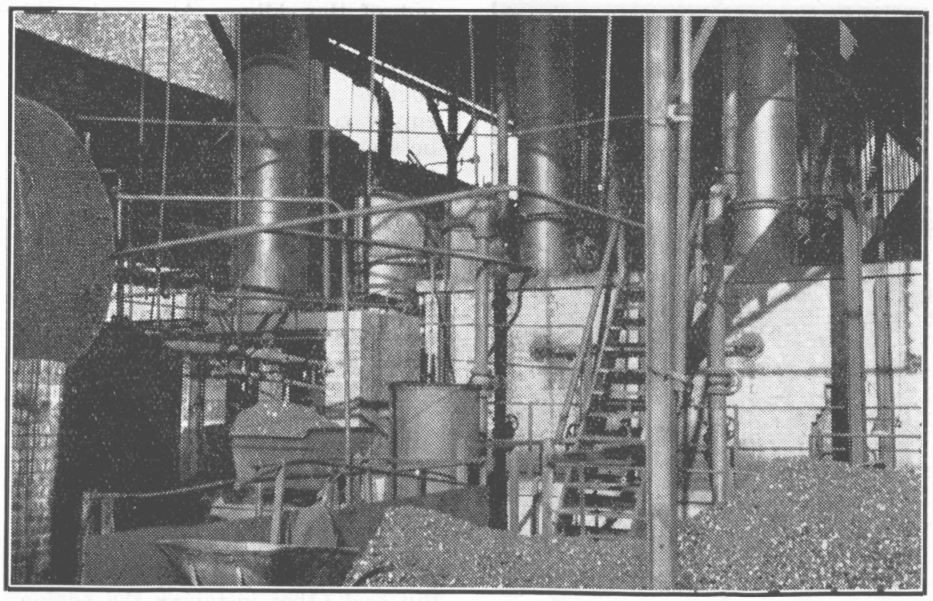
A general view of the charcoal factory described in this article.

IT'S queer, but when you think of charcoal burners you really ought to think of three quite different kinds. I am not going to tell you about the old-timer with his piled-up turves round the smouldering wood; he was described last month. Nor even about the second maker, who buys a large receptacle like a giant dustbin and "cooks" his wood by fool-proof methods into charcoal. In both these ways, the smoke given off escapes into the air and is wasted, though it contains all sorts of most valuable and fascinating things. The third and most modern maker collects that smoke and—but come with me to the Forest of Dean, where I've just seen the plant of a firm that does the smoke-catching as well. Sometimes, curiously enough, the old-timers burn their charcoal in the woods surrounding the firm's factory, just like the ghosts of yesteryear—only they're still alive!

Everywhere in the yard of the factory there was a smell of burning, or at any rate of cooking wood. At the far end there were trucks piled high with small cut-up tree branches, often with the moss or ivy still on them. My guide told me that this moss and stuff didn't matter as long as there wasn't too much of it. What did matter apparently was that the wood must be hardwood, that is stuff like oak, beech, birch and elm, and not resinous pine or fir, which make quite a different kind of charcoal and give off far more "oily" fumes, with too much resin, soot and other undesirable products.

"So you like the smell," said my guide. "It makes a lot of people feel quite sick."

Together we walked over to a giant blackened iron "cave" in the side of the factory. From this "cave" there came such an intense heat that we could not go too near it, and we had to put up our hands to our faces to shield them when we looked in. A truck of blackened wood had just been wheeled out of the "cave," and my guide told me that it was real charcoal. It had entered the "cave" as wood 48 hrs. earlier, and had been cooking ever since at a temperature of 450 deg. My guide showed me the great double doors that were let down when the truck load had been put in, thus making the "cave" into a gigantic oven.



The retorts above the stoking grates. The fumes from the charcoal ovens yield valuable chemicals, including wood alcohol and naphtha.

Some of the cooled charcoal from a truck near by was being unloaded, and I saw that the pieces of wood there were similar to the uncharred ones, except that they had shrunk. One large charred log still remained in the next cleared truck. I was told that it was too big to be converted into charcoal in the first firing, and would have to go into the oven as many as three times. An easier but more expensive way of converting the larger logs into charcoal would be to split them before cooking.

The buildings immediately over the ovens were devoted to the refining of the gases from the charcoal. To get there I climbed an iron ladder and saw a really interesting sight, pipes leading from the top of the ovens to giant water-cooled condensers where the fumes become liquid. I saw liquid spouting from two of the condensers, the first from an oven where the wood had only just been put in, and the second from practically "cooked" wood. The liquid from the process just started was light-brownish in colour and was fairly gushing out. From the cooked wood the flow was much smaller and was sticky stuff, very nearly the colour of creosote.

"That brownish stuff is made up of water, acid, wood alcohol and naphtha," my guide told me. "Now come and see where we split and

refine it." Even if I myself understood all the processes explained to me, it would be no use telling anyone who wasn't well acquainted with chemistry. But very briefly, the liquid I had just seen is mixed with lime. This fixes the acetic acid, which immediately combines with the lime, while the wood alcohol, naphtha and water are then distilled off from the mixture, the separation depending on the fact that their boiling points are different. The wood alcohol forms about one-third of the whole solution.

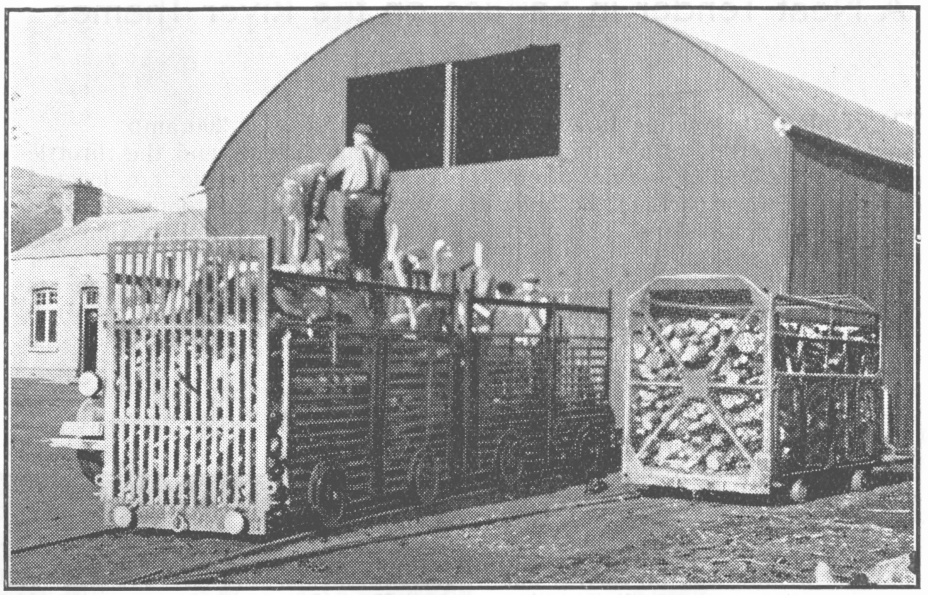
I was told that the acetate of lime produced was used in the manufacture of artificial silk and that the naphtha was used to dilute methylated spirits.

"You see, pure methylated spirits is a white, sweetish and expensive liquid that tastes quite nice," said my guide. "So they first colour it and then add naphtha to it to make it nasty to taste, so that people won't injure themselves by drinking it."

I was told many other interesting things about the processes, but even so I found it almost impossible to believe that the clear colourless volatile naphtha which I saw had come from the dirty black wood I had seen below. And I don't think the old-timers, when they saw the black smoke coming from their turf-covered heaps, would have believed that they were really wasting so much valuable material.

The charcoal itself is a form of fairly pure carbon and, despite its roasting, will burn with a white, intense heat, and almost without smoke. I asked whether any of the charcoal I had seen was used in gas masks, since it is charcoal that you will find in the purifying filters of these. But I was told that this is not the most suitable charcoal, and that nearly all the gas mask material is made from coconut shells.

"Our wood is all English," said my guide. "We get it from the counties of Worcester, Hereford and Gloucester. The charcoal is used mainly in hardening steel to help Britain in her war effort. Before the war we imported large quantities of charcoal from Germany, Belgium, Poland and France, but this of course was stopped, so you can see how important this industry now is to Britain."



Loading a wood car with forest waste to be converted into charcoal.

"Tail End Charlie" Flies Over the Rainbow

By an Air Gunner

WE were on our way back from the Ruhr where we had a pretty rough time. Somehow or other we had lost ourselves among clouds—clouds which seemed to reach right down to the ground. The wireless man let off a flare when the observer judged that we were more or less over the target, and we followed its red glow down and down, but still could not see where we were.

Then we flew into a hailstorm, the engine intakes iced up, and just for one horrible moment both engines cut. By the time they had started again there were flickers and flashes all round us.

"Lightning" said someone. But it wasn't lightning this time, as we knew when a real heavy 'Archie' went 'whoof,' not far from my turret. The Huns down below could not see us, but they had got their predictors following us very nicely, and soon the cloud that we sailed through was lit by a bright golden glow, as 20 or 30 searchlights tried to pierce through to find us.

For the next 20 minutes we cruised about, dodging and diving, with shells and 'Flak' bursting all round. Then we came into free air from a lower layer of cloud with another layer up above us. The firing seemed to have stopped, and the searchlights had disappeared, except two which trailed along on our tail, one on either side of my turret.

I reported them to the captain.

"Look out, Tail Gunner!" his answer came back. "I've just seen a fighter come up on the port bow."

This is the call for which "Tail End Charlie" waits. For eight hours or more he sits in the dark or in the garish brilliance of searchlights, alone with his thoughts and his guns. Without playing any part in it he hears all that goes on in front—the taking of 'fixes,' the dropping of flares and of bombs. But when fighters appear on the scene that is "Tail End Charlie's" big moment. Only he can deal with them.

I swung round my turret, urgently searching the sky. Then, once more, we flew into cloud. The excitement was over.

Well, what with the cloud, and one thing and another, we were very late getting back home. The east was saffron as we passed over the Dutch coast, where I fired a short burst at a pair of inquisitive searchlights that clung stolidly to my turret. Long before we had sighted the coast the sky was lit up by the sun, the clouds were breaking and pale pink cumulus floated high up in the blue.

Low on our beam a little dark cloud drifted along, spilling rain down on the sea. A shimmering rainbow arched between vapour and water. The sun was rising behind.

We were nearly home and I gave a shout of delight.

"Just look at the lovely rain—Look out!" I yelled. "Unidentified aircraft coming up fast on starboard quarter."

Out of the sun, swift and sinister and swooping towards us, sped a long dark-bodied aircraft, its twin tail rudders cocked high above the thin wings. A Messerschmitt "Me. 110," one of the famous "dawn patrol," waiting for tardy home-comers. I centred it well in my sights. Six hundred yards . . . four hundred yards. My fingers closed on the triggers.

Suddenly, unexpectedly, the strange aircraft swung to one side. Yellow rings showed on the fuselage. With a gasp I realised that I had been on the point of shooting down one of our Coastal Command aircraft, a Lockheed "Hudson."

As the captain said when we got home . . "Serve him right if you had! Trying to scare us like that."

"Tail End Charlie" agreed.

Repairing Ships by Electric Welding

A Neat Tender in Service on the River Thames

By T. R. Robinson

ELECTRICAL welding is a very valuable method of obtaining an extended period of service from damaged or worn parts of the hulls and machinery of ships. The chief difficulty met with in its use is that many of the parts needing this kind of repair are so heavy and awkward to handle that the cost of removing them to the welding-shop, and of replacing them afterwards, is often greater than that of the actual welding process. To overcome this problem the generating plant is sometimes loaded into a barge or lighter, which is towed to the side of the ship and moored there, so that the welding can be carried out with a minimum of dismantling work. This does save considerable time, but to some extent is still a makeshift method.

To enable such work to be dealt with more rapidly and efficiently, Harland and Wolff Ltd. have fitted out a neat welding tender, named the *"Wolf,"* which serves as a mobile equipment in the London Docks area. The tender is a small but sturdy craft, weighing only 11 tons and having a hull of galvanised steel construction. Its power-plant is a 12/24 h.p. Morris Navigator engine, fitted with magneto ignition, which serves both to propel the craft and to drive the dynamo supplying current for welding. This engine is mounted amidships, and is fitted with a particularly ingenious dual drive, compactly mounted in the very limited space available. The engine is located forward in the engine-room, and behind it are two shafts placed vertically one above the other, the upper one being coupled directly to the compound-wound dynamo and the lower carrying the driving member of a dog-clutch used to engage it with the propeller shaft when necessary.

The control panel, with the necessary switches and control for the regulation of voltage and current strength, is mounted above the dynamo, and lockers for the storage of welding equipment, tools and supplies are fitted along the sides and at the forward end of the engine-room. The normal speed of the dynamo is 1,440 r.p.m., and the output at 75 v. is 200 amp.

The clutch lever and the throttle control of the engine are located outside the engine room, and are close beside the wheel, so that one man can easily handle the tender and make the necessary adjustments from a position where he is in full control of the movements of the vessel.

A rather strange point in the assembly of the drive shafts is that the dynamo is never disconnected from the drive. It therefore revolves idly when the engine is being used to propel the tender, but this is immaterial, and is provided for in the controls.

The current for welding, after passing through the control panel, is fed to two main terminals on the rear engine-room bulkhead, and to these are connected the leads passing to the point of repair.

When a ship needing repair arrives in the Thames, the damaged or worn parts are first inspected by an expert, and if it is decided that the welding tender is to be used for the work, she makes her way to the place where the ship is moored and ties up alongside. Then the clutch is operated to disengage the engine from the propeller shaft, and two leads are attached to the large wing-nuts that form the main terminals of the tender. One lead is connected to the hull of the ship to serve as an "earth" or return path for the current, and the other is fitted to the welding tool used by the repairer.

As soon as this has been done, the engine speed is adjusted and the control panel set. Welding can then be proceeded with. Only a minimum of supervision is needed by the engine and dynamo, which are able to run for long periods without interruption. On one occasion the plant was kept continuously in operation for 58 hrs. in order to complete an urgent repair.

All kinds of welded repairs have been carried out with the *"Wolf's"* equipment, but one of the most interesting aspects of this work is the welding of the buckets and similar parts of dredgers that are subject to heavy wear. The Thames dredgers often receive repairs from the welding plant of the *"Wolf,"* for this equipment enables the buckets to be reconditioned without removal from the chain, and the time that the dredger is out of service is considerably reduced. In cases of emergency, it is even possible for the mobile welding tender to go to the dredger at the point where it is operating, and by so doing to save many hours of time in getting the craft back to work.

The *"Wolf"* is able to travel over a wide area, and has even gone as far as Sea Reach to carry out repairs.

The "Wolf" tied up alongside a dredger while engaged on repairs to the buckets. Photograph by courtesy of Harland and Wolff Ltd., London.

Story of the Midland Compound

THE splendidly realistic cover of this issue of the *"Meccano Magazine"* showing a L.M.S. train leaving an important terminus, will appeal to all our readers who are railway enthusiasts and especially to those who favour the locomotives of our largest railway company. The engine shown, No. 1007, is a typically Midland type, for it is one of the well-known Deeley Compounds, developed on the Midland system, from which the numerous Standard Compounds of the L.M.S. have been evolved.

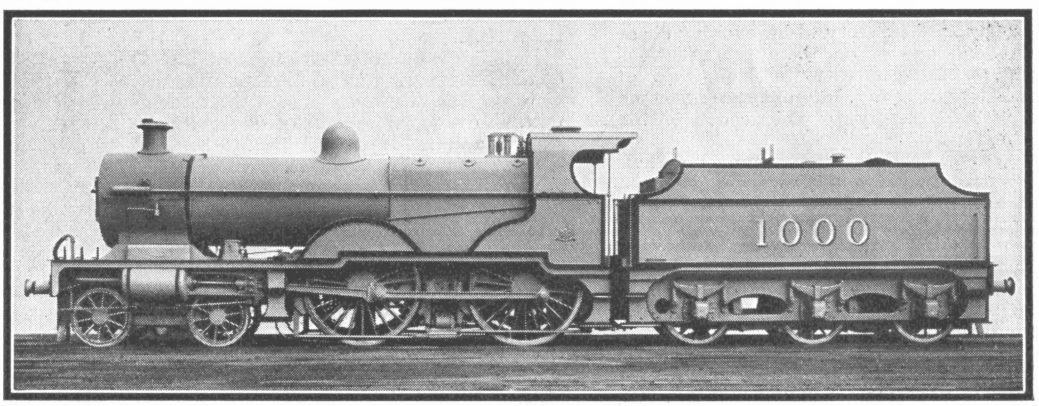
The Midland Compounds are extremely long-lived locomotives, the original design dating back to the early years of this century. It is remarkable too that only 45 of these engines were in service in Midland days, and none of these had been built more recently than 1909. With the formation of the L.M.S. the type, with slight modifications, was adopted as a standard, and the whole family of Compounds now totals 240 engines, their numbers running from 1000-1199 and from 900-939.

Although the Compounds have been familiar objects at St. Pancras for many years past they were originally designed for duty on the difficult Leeds and Carlisle section of the Midland, which at Aisgill attains a height of 1,167 ft. The first two engines were put into service in 1902, and worked between Leeds and Carlisle. These were Midland Nos. 2631 and 2632. Three more similar engines, Nos. 2633, 2634 and 2635, followed in 1903, but these were used between St. Pancras, Nottingham and Derby.

In each of these five locomotives the original "Smith" system of compounding, which had been devised and applied experimentally on the North Eastern Railway, was employed. This involved three-cylinder propulsion, one high-pressure cylinder being placed between the frames and two low-pressure cylinders outside them; both on the North Eastern experimental engine and on the Midland ones all three-cylinders were connected to the leading coupled axle of a 4–4–0 type engine. The high-pressure cylinder was connected to the actual crank axle and the low-pressure cylinders drove on to the crank pins of the leading coupled wheels.

Easy starting had not been a strong feature of previous compound systems, but it was provided by the Smith arrangement, in which boiler steam was admitted to all three cylinders at starting. Admission to the high-pressure unit was direct, but in the case of the low-pressure units the steam had to pass through a reducing valve. This valve, which could be operated from the cab, was situated on the side of the smoke-box. After the first exhaust from the high-pressure cylinder the supply of boiler steam to the low-pressure ones was cut off automatically and exhaust steam from the high-pressure cylinder took its place, so that compound working came into operation. To ensure that the power output of the low-pressure units should be maintained, however, in case the pressure of the high-pressure exhaust fell below the limit set by the reducing valve, a supplementary supply of steam from the boiler was introduced. The maximum pressure allowed in the low-pressure steam chest could not be exceeded, however.

In addition, if the pressure in the high-pressure cylinder was below that of the receiver or steam-chest, steam could pass to either side of the high-pressure piston by means of non-return valves. Compression of the spring of the reducing valve by the driver increased the pressure of steam passing to the low-pressure cylinders. Further compression resulted in the admission of live steam to the low-pressure cylinders, while the high-pressure piston was placed in equilibrium by the admission of steam on either side of it.



L.M.S. No. 1000, the first Midland Compound showing the final development of the design before grouping. Photograph by courtesy of the L.M.S. In its earlier days it was No. 2631.

The five Smith Compounds on the Midland were extremely successful. They were good starters, they accelerated quickly and could attain, for those days, quite high speeds. No. 2632 in fact was timed at 91.8 m.p.h. over two successive miles with 240 tons behind the tender. However, when at Derby Mr. R. M. Deeley succeeded Mr. S. W. Johnson, under whom the original design had been worked out, he decided to simplify to some extent the main details of the Smith system. So in the new Deeley Compounds, Nos. 1000-1009 of 1905, the reducing valve arrangement was done away with and a special form of regulator valve substituted for it. This had three steam ports, one of them being connected to the low-pressure cylinders by means of a small auxiliary steam pipe. The main regulator valve had a small "Jockey valve" on the back of it, which, when the regulator handle was first moved by the driver at starting gradually uncovered two of the ports, one of them being that leading to the auxiliary pipe. Thus steam was admitted to all three cylinders, but as the non-return valve arrangement was retained on the high-pressure cylinder the high-pressure piston was maintained in equilibrium with steam on each side of it.

Thus the Deeley Compounds, on starting, worked as two-cylinder simple engines, with the low-pressure cylinders doing the work. As the regulator handle was moved further over, however, the auxiliary port was closed and steam admitted directly to the high-pressure cylinder only and compound working was then brought into operation. This arrangement was retained in all the subsequent Compounds, including those built under the L.M.S. engine. The original Smith Compounds also were altered to the modified system introduced by Deeley.

To the 1905 engines were added Nos. 1010-1029 in 1906, Nos. 1035-1039 in 1908, and Nos. 1040-1044 in 1909; no more engines of the type were built until 1924. In the meantime the provision of superheating apparatus had provided a further step in the development of the general design, and it was as a superheated engine, but with slightly reduced driving wheels, that it became standard on the L.M.S.

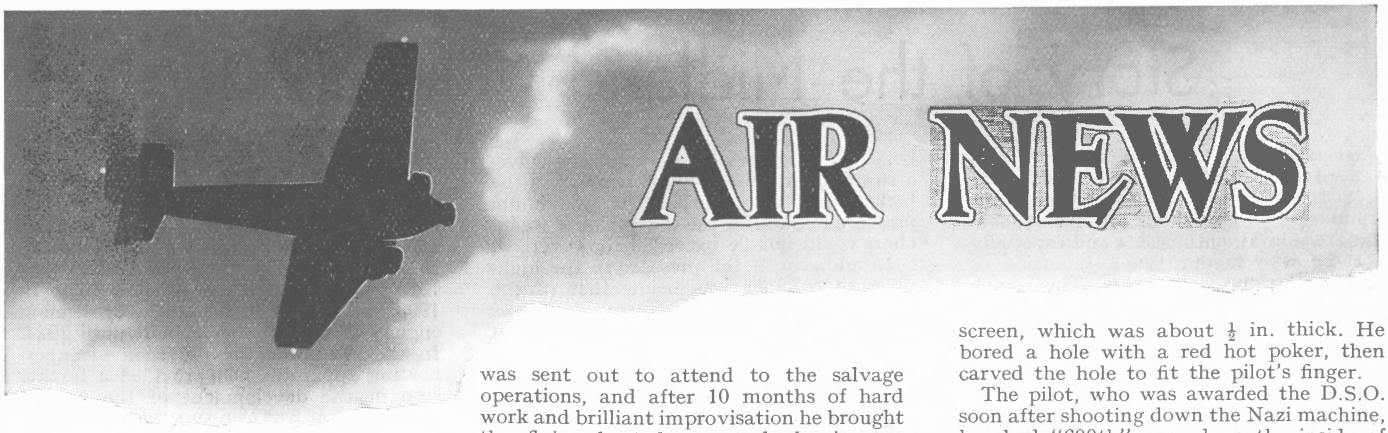
In the numbers given above it will be noticed that there is apparently a blank between No. 1029 and No. 1035. Actually in the re-numbering that took place on the Midland in 1907 the original Nos. 2631-4 became Nos. 1000-1004, the earlier Deeley engines Nos. 1000-1029 becoming Nos. 1005-1034.

In appearance the Deeley engines were totally different from those of Johnson. The cab, splashers and footplating took on the typical appearance with which we are all so familiar, and the well-known flat-sided tender running on six-wheels replaced the double-bogie "water carts" then favoured for the bigger engines.

Grouping produced further modifications in detail and in external appearance, although the earliest L.M.S. Compounds Nos. 1045-1064 exactly resembled externally the Midland engines as superheated and fitted with extended smoke-boxes.

With the multiplication of the type and the extension of its activities the engines built from No. 1065 onwards were provided with shorter chimneys and flatter domes to conform with the Northern Division loading gauge. Then from No. 1085 onward the right-hand drive that had been retained from Midland practice was altered to conform with the standard left-hand position for the driver adopted on the L.M.S. Under the Stanier regime new standard chimneys have been fitted to some of the Compounds.

So the Compounds are now found at points as far afield as Aberdeen and Bristol. Although ousted from the principal duties by the Stanier six-coupled classes they still appear on trains of suitable weight and no doubt will continue to do so for some time yet.



Bombers Outwit Italian Fighters

During occasional lulls in the operations in the Western Desert Royal Air Force pilots there have been able to describe some of their experiences.

The following story of an exciting chase in which one of our bomber formations raiding Bardia outwitted a strong force of Italian fighters in a 140-mile race for home was told recently by the leader of the formation.

As the R.A.F. bombers approached their objective they found themselves facing a 60 m.p.h. wind. Near the target they spotted Italian fighters 2,000 ft. below them climbing rapidly to attack. There was a certain amount of anti-aircraft fire, but nothing serious, and in spite of the enemy aircraft so near at hand, the bombers carried on with their raid.

"My flight released their bombs in one salvo," said the Squadron Leader. "All the time the fighters were drawing closer to us, but we managed to take a couple of quick photographs of our bombs bursting on the target. It was then time to make tracks for our base, and we turned out to sea. We knew that we should be chased, but with the wind behind us we streaked along at a grand pace. Some of the fighters gave up the chase, but two of them hung on and kept blazing away at us. We made for a cloud at 4,000 ft., and whistled into a turn under its cover. The enemy fighters lost us for the time being and, with more cloud to help us, we led them a merry dance. At last they decided to give up too. They had followed us for 140 miles, but we had carried out the bombing on which we set forth and had got away all right from a large force of fighters.

"We hope that returning against the strong wind over the Mediterranean, they had difficulty in getting home—they must have been running low in petrol, and they had a long jaunt back to Libya. When they made off we re-formed and came back to our base in comfortable style. It had been a really satisfactory morning."

Civil Aviation Honours

The New Year Honours List this year included the names of Capt. J. C. Kelly Rogers, whose portrait was reproduced on page 453 of the October 1940 *"M.M.,"* and Section Engineer George Halliday, both members of the staff of British Airways.

Capt. Kelly Rogers has been awarded the O.B.E. In command of the flying boat *"Clare"* he led the British Airways trans-atlantic flights during the summer and autumn of 1940. When the flying boat *"Corsair"* came down on a narrow river in the Belgian Congo, in March 1939, she was badly damaged. Capt. Kelly Rogers was sent out to attend to the salvage operations, and after 10 months of hard work and brilliant improvisation he brought the flying boat home, and she is now operating on the Empire routes of British Airways. In the salvaging of *"Corsair,"* probably the most remarkable operation of its kind in the history of flying, Captain Kelly Rogers was assisted by Engineer George Halliday, who has been awarded the M.B.E.

Halliday is one of the pioneer engineers of the Empire air routes. Shortly after his work on *"Corsair"* he was sent to Karachi to take over that section of one of these routes, and he is now Assistant Service Engineer, Overseas Services, at British Airways headquarters in Durban. He is a native of Dumfries, and a typical example of the men who have made Scotch engineers famous throughout the world.

Westland "Lysander" Army Co-operation monoplanes flying in formation. Photograph by courtesy of "Flight."

R.A.F. Fighter Markings

A further change has been made in the camouflage of aircraft of the Royal Air Force Fighter Command, by the reversion to a black finish for the underside of the port wing. The finish of the starboard wing remains light blue.

The 600th Victory

A transparent signet ring made from the windscreen of a Messerschmitt "Me 109" is now worn by the R.A.F. "Spitfire" pilot who helped to shoot down a German fighter, and in so doing brought his station's "bag" to 600. The "Me. 109" crashed near the coast. The flight sergeant engaged on maintenance, who is a skilled handicraft worker, cut a piece an inch square from the Messerschmitt's windscreen, which was about ½ in. thick. He bored a hole with a red hot poker, then carved the hole to fit the pilot's finger.

The pilot, who was awarded the D.S.O. soon after shooting down the Nazi machine, has had "600th" carved on the inside of the ring.

"Guba" Now Used by British Airways

It is now known that the Consolidated flying boat *"Guba"* bought last year by the Ministry of Aircraft Production has been employed on British Airways' service to Lisbon, transporting air mails and freight between that port and England.

Lisbon is well-known as the eastern terminus of Pan American Airways' trans-atlantic service. The Boeing "Clipper" flying boats making the ocean crossing have been equipped with additional fuel tanks to carry an extra 1,200 gall. of petrol, so that the aircraft can fly to Lisbon either by the Bermuda route or direct from the United States.

* * * *

American Airlines have been granted a license by the Mexican Ministry of Communications to operate an air passenger and freight service between the United States, Monterrey, and Mexico City. One condition of the permit is that Mexican ground staffs must be employed at the call points situated in that country.

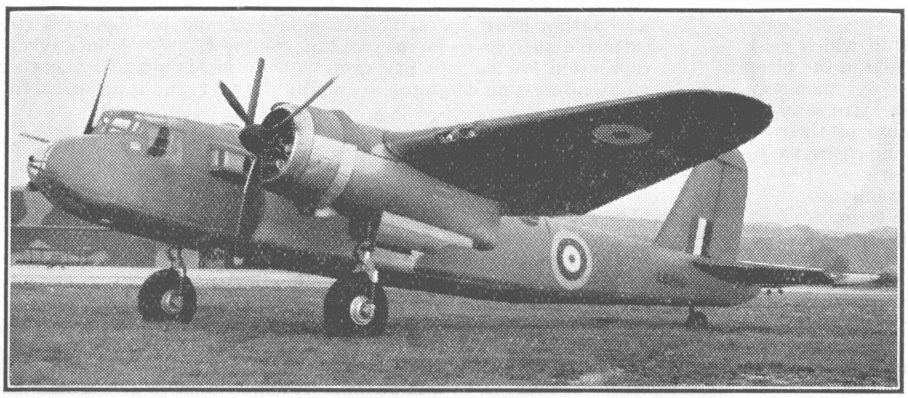
* * * *

A German pilot taken prisoner in Kent said that while flying at 25,000 ft., he had been "attacked in the rear" by his rubber dinghy, which had become accidentally inflated. In an effort to master the dinghy he lost control of his machine and went into a spiral dive. On pulling out, the engine stalled, and he had to land.

New Bomber for the Royal Air Force

The upper photograph on this page shows the Blackburn "Botha" I General Reconnaissance and Torpedo Bomber, another of the fine new types of British aircraft now going into service with the Royal Air Force. No details of the performance of this interesting machine are available.

The "Botha" I is a high wing monoplane



The Blackburn "Botha" I General Reconnaissance and Torpedo Bomber, a fine British machine now going into service with the Royal Air Force. Photograph by courtesy of Blackburn Aircraft Ltd.

of 59 ft. span, with twin "Bristol" Perseus XA engines in the leading edge of the wing. The detachable rear portions of the engine nacelles are mounted below the wing centre section and carry the undercarriage units when these are retracted. The main fuel and oil tanks also are in the wing centre section.

The long-nosed fuselage has an enclosed cabin for the crew of four, who consist of a pilot, a navigator who also acts as bomb aimer, a wireless operator, and a gunner. The pilot's seat is at the port side of the forward end of the cabin and the bomb aimer's prone position is to the starboard side. A gangway extends along the starboard side and provides inter-communication between forward and rear positions. There is a power-operated multi-gun turret mounted on the upper side of the fuselage, to the rear of the wing trailing edge, a position that gives a wide field of fire. Access to this turret is gained from the rear of the cabin.

When the Germans Used American Fighters Against Us

Pilots of a "Spitfire" squadron of the R.A.F. Fighter Command were specially interested in the recent news that American aircraft flown by British naval pilots had brought down a German raider. It brought back memories of fights they had last summer—with American-built machines as their opponents.

The booty taken by the Germans when France capitulated included a number of American aircraft, some of which were Chance Vought "156" dive-bombers, and others Curtiss "Hawk" fighters. Both types were used in small numbers by the Germans in their big raids on shipping in the English Channel, but in their handling of them the Nazi "owners" did them less than justice.

Chance Voughts were first sighted one July morning by a sergeant pilot. He was attacking a Messerschmitt "Me. 109" when he saw three aircraft about 2,000 ft. below him. They looked, he said, like Blackburn "Rocs," but they were silver underneath, slightly darker on top, and had black crosses on the fuselage and wings. That was enough for the sergeant. He wheeled round and attacked them, and after firing a long burst he saw pieces falling away from one of them. The sergeant closed to 300 yds., and the enemy machine fell away in a spin. It was later confirmed as destroyed.

In the afternoon a Flight Lieutenant of the same squadron, after dealing with an "Me. 109," fired at another Chance Vought, and he considers it probably destroyed.

About a month later a Curtiss "Hawk" was engaged over the channel by a pilot of another "Spitfire" squadron. The "American" fighter staggered away, the Nazi pilot apparently having lost control.

British fighter pilots are glad that American fighters are now available to us. Somehow it went against the grain to shoot them down, but when they were on the "other side" it was a job that had to be done.

Success of Australia-New Zealand Air Service

The new air link of Empire between Australia and New Zealand across the 1,340 miles of the Tasman Sea is now firmly established. In the first four months of operation the two flying boats "*Aotearoa*" and "*Awarua*" of Tasman Airways made 45 trips and flew a total of 60,300 miles.

At first one flight a week in each direction was made, but already the service has been increased to three flights a fortnight in each direction, on account of the doubling of British Airways' "horseshoe" service from Durban to Sydney, and the starting of the Pan American service from San Francisco to Auckland. It is likely that the trans-Tasman crossings will be further increased to two services a week each way.

The flights have been made with remarkable regularity. Weather conditions over the Tasman Sea are notoriously unreliable, and many people declared that it would be impossible to keep to a proper timetable. Meteorological services have been so improved, however, and the performance of the British flying boats is so satisfactory, that a regularity figure of 97.6 per cent. has been achieved.

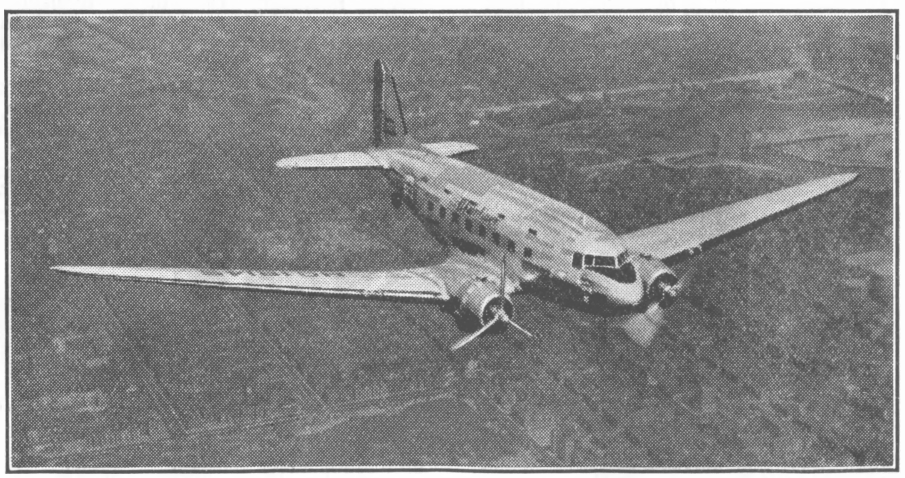
The Late Captain Horsey: A Fine Civil Pilot

British civil aviation has lost a fine airman by the death on active service of Capt. H. J. Horsey, a founder pilot of Imperial Airways, and one of the best known figures on both the Empire air service and that to the Continent before the war.

Capt. Horsey had been seconded to Air Transport Auxiliary, the organisation that ferries military aircraft from factory to squadron. On the 3rd January last he was duty pilot at his Ferry Pool. Normally the duty pilot is not expected to fly, but as all other available pilots were extremely busy that day and the delivery of a certain new type of aeroplane was urgent, he volunteered to take it up, although the weather was bad. On the way the machine developed engine trouble, and in making a sudden forced landing on bad ground he crashed and was seriously injured. He died shortly afterwards.

If Capt. Horsey had lived to the end of this year he would have completed 25 years as a pilot, as it was in 1916 that he qualified with the Royal Naval Air Service. His work for Imperial Airways was mainly on European routes, but periodically until 1936 he operated flying boats across the Mediterranean and on the route from Cairo to Khartoum. For a year or so he was on landplanes in India and Africa. He had flown about 1,690,000 miles without a major accident and without injury to a single passenger in machines he piloted. At one time he was assistant Flying Instructor on landplanes at the Imperial Airways school.

In the present war Capt. Horsey took great pride in the fact that his own active service was supplemented by that of his 18½ year old son Michael, a pilot officer in the R.A.F.



A Douglas DC-3 of United Air Lines, U.S.A., in flight over New York City with one "Twin Wasp" engine stopped.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

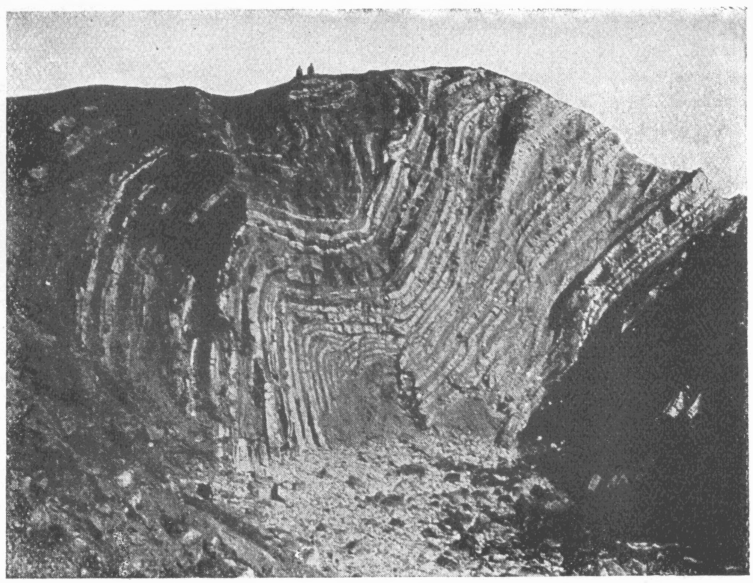
"Geology by the Wayside"

By I. O. Evans. (Murby. 3/9)

There are many secrets hidden in the Earth on which we live, and it is fascinating to read some of these when told in the pleasant and easy style of the author of this attractive book. Fine scenery always excites our admiration, and here we can learn why some parts of the country are attractive because of their rounded hills, while others are cut by deep and perhaps gloomy valleys or marked by rocky masses often fancifully shaped. The secrets of all these, and of unattractive and uninteresting flat lands, are to be found in the formations below the surface and in the never-ceasing changes these undergo.

The author makes the meaning of Earth lore clear to us by showing how the smallest details that we can observe during a journey over the hills, along the course of a stream, or by the coast, have been decided by the rocks. Then comes the story of the effect of wind and rain, frost and sunshine; and we are told how rivers cut channels for themselves, form small lakes at bends, create waterfalls and even steal headwaters of other streams to make themselves bigger. The seashore gives us more interesting details, and we read of lands that have risen above the sea, carrying with them to almost unbelievable heights the shells of creatures that lived in the sea millions of years ago. The part played by fire in creating such rocks as granite and lava is explained, and we learn something of the fossils that provide us with a timetable for so many rocks and help to explain for us how they were formed.

The book ends with useful hints on the best way of learning something of Earth lore for oneself, and a short but useful section by Professor G. W. Robinson explaining how soils have been formed and how they vary according to the rock on which they are produced. There are eight full-page plates and many useful explanatory drawings in the text.



Contorted rock beds at Lulworth Cove, Dorset. This illustration and the one below are from "Geology by the Wayside," reviewed on this page.

"British, German and Italian Aircraft"

(Hutchinson. 2/6 net)

Air warfare this year is expected to be on a greater scale than ever before and it is advisable that everybody should be able to recognise our own and enemy military aircraft immediately they are seen. Familiarity with the appearance of these machines can be gained by examining pictures of them and learning to recognise details, for which this book provides the necessary material. It contains a carefully selected series of photographs, accompanied by diagrams and brief explanatory notes, of British, German, and Italian aircraft now in service. In both photographs and drawings each machine is shown from various angles, and details are given of duties, performance and armament, where permissible.

A perched block at Norber, in Yorkshire, which has been carried to its present position by a glacier.

"An A.B.C. of Model Aircraft Construction"

By C. S. Rushbrooke. (Price 3/- net)

"Solid Scale Model Aircraft"

By J. H. Elwell. (Harborough Publishing Co. Ltd. Price 3/- net)

The great interest now taken in aviation is reflected in the rapid growth of the model aeroplane hobby and the steady output of books designed to help the model aircraft builder. These two additions to the well-known series of such books published by the Harborough company largely break new ground.

The first, *"An A.B.C. of Model Aircraft Construction,"* is, as the title indicates, intended for the beginner in the hobby, and deals mainly with essential constructional and designing information. The author is an authority on his subject, and has achieved considerable success in model aircraft competitions and an enviable reputation for high quality workmanship in his models. There are many interesting diagrams to amplify the text, and some attractive photographs showing young model aircraft builders engaged in their hobby. Finally there is a selection of typical model aircraft suitable for the beginner to tackle, with plans and instructions in respect of each machine; and a very useful list of model aeronautical terms.

Flying and non-flying models are two distinct branches of the hobby. *"Solid Scale Model Aircraft"* deals with the construction of non-flying models. After discussing the merits of this type of miniature aircraft the author deals with the tools required by the enthusiast, the most suitable size or scale of model and the materials to use. Then stage by stage he describes how the actual construction of the "solid" model should be carried out, supplementing his non-technical instruction with many sectional drawings, notable for their simplicity. When the model is finished and painted he tells how to make suitable scenery as an appropriate setting for photographing the machine, and gives some very sensible advice on the actual taking of the picture. The final chapter tells how to build scale "solids" of three famous R.A.F. fighters, the "Defiant," "Spitfire," and "Hurricane."

The many half-tone photographs of other non-flying models in the book should prove an added incentive to the reader to achieve similar skill and accuracy in his own model-building.

"The R.A.F. in Action"

(A. and C. Black. 7/6 net)

Everybody who has been thrilled by the exploits of the Royal Air Force, will thoroughly enjoy this record in word and picture of the work of that Service during the first year of the present war. The book has been produced with the co-operation of the Air Ministry, and so has the stamp of authority. The summary of the year's achievements of the respective R.A.F. Commands makes thrilling reading, and forms a fitting preface to the pictorial section that follows it. In this section 100 specially selected photographs illustrate each branch of R.A.F. activity. These pictures convey vividly the enthusiasm and skill of the men of the R.A.F.

A royalty on every copy of the book that is sold is given to the Royal Air Force Benevolent Fund.

PHOTOGRAPHY

Combination Printing and Patchwork

BY a simple process known as combination printing it is easy to produce very effective and if desired, amusing photographs. For example, the process may be used for putting a background to a portrait or for placing figures of people or animals in a view, while some photographers use it to obtain humorous results, such as pictures of a small man with a huge head or a building in an unusual position. The process requires no special apparatus and consists of combining two or more negatives to make a single picture on one sheet of paper. Two excellent examples of the kind of pictures that can be produced in this way are the girl blowing bubbles and the maiden sitting on a toadstool that appear on this page. These are the work of Mr. H. Bastin, Reading.

For the most simple method of combination printing some P.O.P. and a tube of red water-colour paint or any of the opaque mixtures sold for blocking out negatives, are all the materials required.

Let us suppose that we have a photograph of a friend the effect of which is rather spoiled by the unsightly brick-wall background. How much nicer it would be if we could transplant him into the foreground of an attractive landscape! If the negative of such a scene is available it is quite easy to effect the change, and the operation needs little skill beyond reasonable care and attention to one or two essential details, the most important of which is that of lighting. Obviously it would be absurd to transfer a figure lighted from the left into a view lighted from the right, so care must be taken to see that both the pictures are lighted from approximately the same direction.

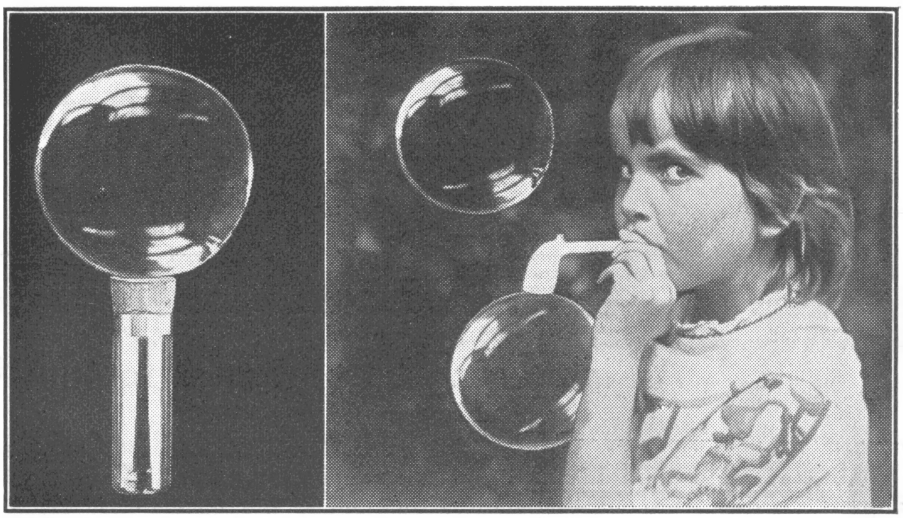
Assuming that the negatives pass this test, work is commenced on the portrait negative, which I call "A," the landscape negative being labelled "B" for identification purposes. The first thing to be done is to paint out everything except the portrait on "A," a fine-pointed brush being used in order to preserve the outline of the figure. As soon as the paint is dry an ordinary P.O.P. contact print is made, which will show the figure against a plain white background.

The next step is to paint over the figure on the print so that it is completely protected from light action while the remainder of the print is being made. Care must be exercised to ensure accuracy in exactly covering the outline, overlapping either way being avoided.

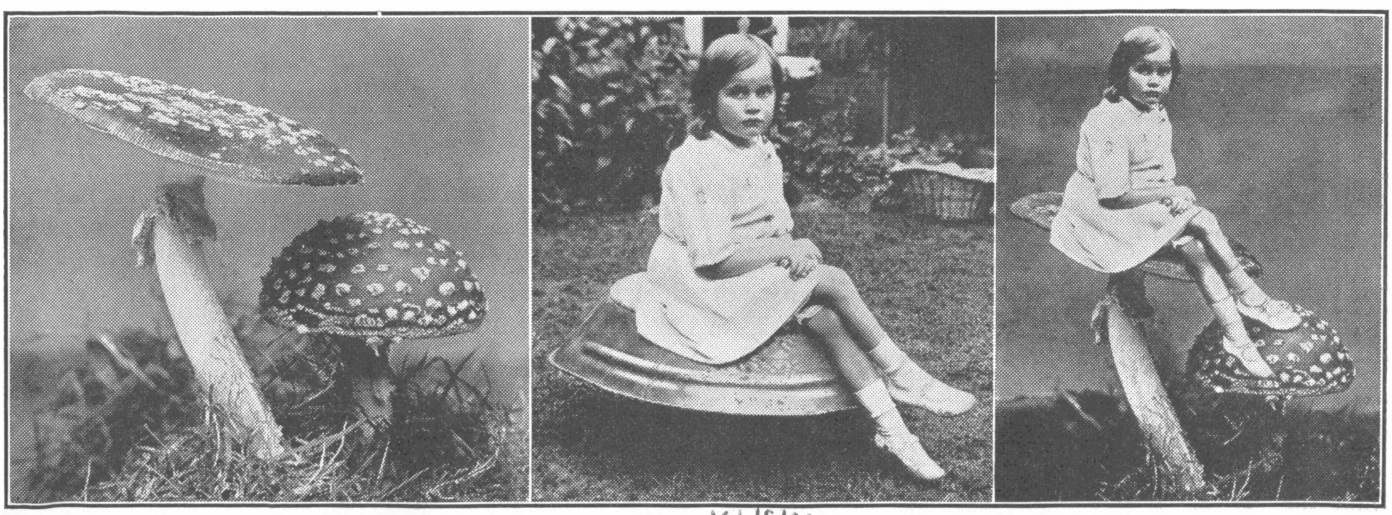
The paper is now placed in the printing frame in contact with negative "B," and the landscape is printed in until it is of the same depth of tone as the figure. The print now shows a landscape with a paint-covered figure. A little rinsing under the cold water tap will quickly remove the paint, and then the complete picture is ready for toning and fixing in the usual manner. Provided that all the operations have been carried through carefully, there should be nothing to indicate that the picture is otherwise than a straight print from one negative.

Another way in which two or more prints can be combined is by means of the "paste-on" or "patchwork" process. This method is particularly suitable for producing amusing effects. In this process the parts of the print to be added to another are simply cut out and pasted on. The combined print is then copied in the camera.

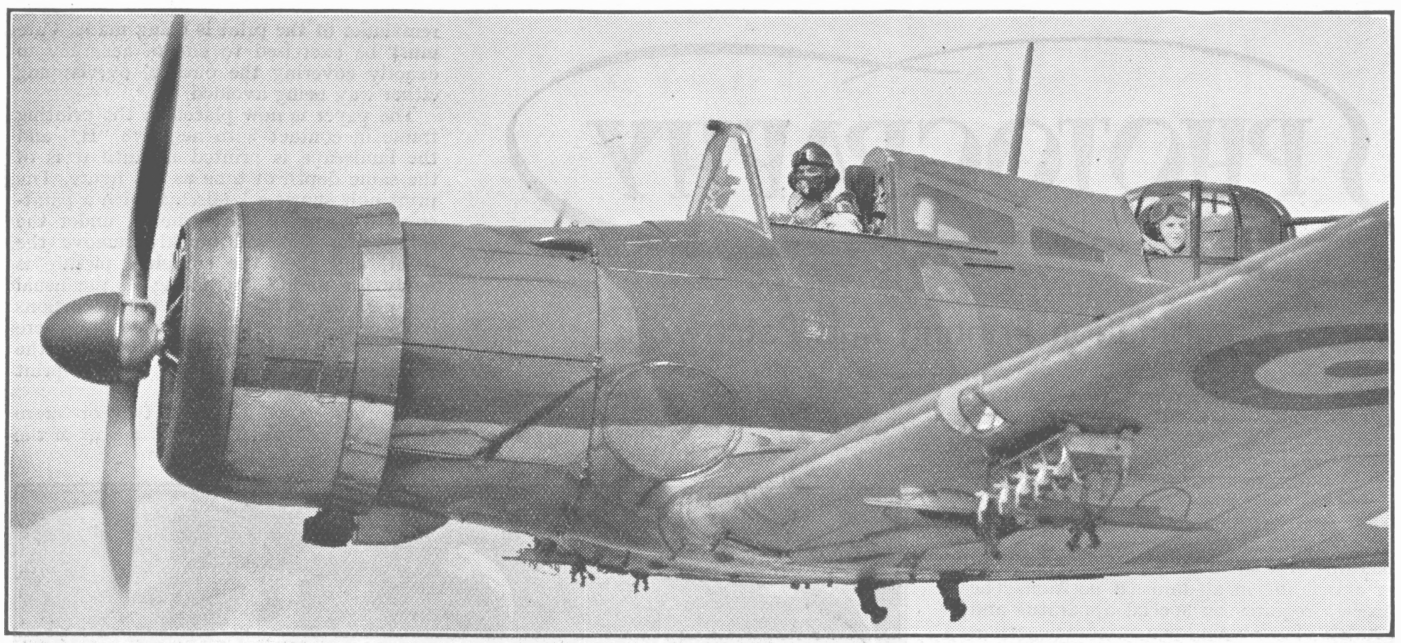
It is essential that the joined-up prints be of exactly the same tone, and the picture to be cut up should be printed on thin paper, as the edges of the cut-out parts are liable to show in the finished print.



"Blowing Bubbles"—by H. Bastin, Reading. The bubbles were photographed separately as shown on the left and then combined with a print of the little girl.



Another excellent example of combination work by Mr. Bastin. The finished picture of [redacted] sitting on a toadstool was produced from the two pictures shown on the left of it.



Blackburn "Roc" two-seater Fighter, showing the gun turret aft of the cabin and the bomb racks under the wings. Photograph by courtesy of "The Aeroplane."

The Blackburn "Roc"

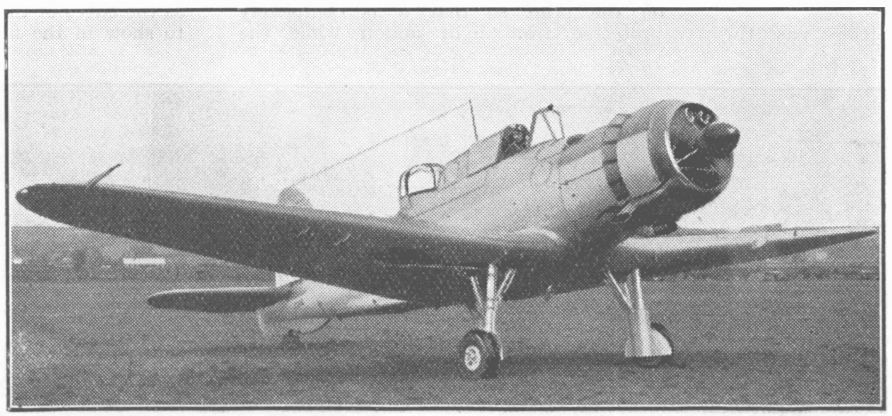
An Interesting New Fighter for the Fleet Air Arm

THE striking successes of the Fleet Air Arm against the Italians have aroused great interest in this important branch of the Royal Navy, and especially in the types of aircraft it employs. Some of the older types have done splendidly, and among the new machines the Blackburn "Skua" fighter dive-bomber has given convincing proof of its high efficiency. This fine machine was described in the March 1940 *"M.M."*

Another new Blackburn type of aircraft, very similar in design and construction to the "Skua," is the "Roc" illustrated on this page. This two-seater fighter was designed and equipped specially to meet the needs of the Fleet Air Arm, and it has taken part in many operations where its very sturdy construction and great manœuvrability have enabled it to do excellent work even in face of faster machines. Like the "Skua," it is a low wing cantilever monoplane of metal construction with a "Bristol" Perseus XII engine; but it has a Boulton-Paul four-gun, power operated turret at the rear of the cockpit, instead of the one movable rear gun and four fixed guns of the other machine.

The wings are of stressed skin construction, and as stowage space in an aircraft carrier is very limited they are arranged to fold about inclined hinges on the centre plane. In their folded position they lie back alongside the fuselage with their leading edges upward.

The fuselage is a metal monocoque structure, a type in which the skin takes most of the stress set up by the loading of the aircraft. The crew consists of a pilot and a gunner who also acts as observer and wireless operator; and they occupy an enclosed cabin with a sliding roof section over the pilot's cockpit. Access to the rotatable gun turret is gained from the rear of this cabin. Watertight compartments in the fuselage, together with others in the wings, ensure buoyancy for a long period in the event of the machine having to make a forced descent into water, even if the cockpit becomes flooded. As in the "Skua" the tail unit of the "Roc" has the fin and rudder set forward of the tailplane and elevators.



The "Roc" as seen here is used from aircraft carriers, but it can be fitted with a twin float undercarriage and used as a seaplane from other ships. Photograph by courtesy of Blackburn Aircraft Ltd.

The "Roc" can be used either as a landplane from aircraft carriers or as a seaplane from other ships, the wheel and float undercarriages for it being interchangeable. The wheel undercarriage is a retractable one, and the twin float undercarriage is of normal construction.

ENGINEERING NEWS

Siberian Dredger's Great Journey

A large floating dredger, built in the United States for work in Siberia, had to travel two-thirds of the distance around the world to reach its destination. It was first loaded in parts on 75 flat railway trucks in South Milwaukee, where it was constructed, and taken by rail to Baltimore. From there it went by boat to Murmansk on the Barents Sea, where it was again loaded on to railway trucks and taken to Irkutsk, in Siberia. From there it was transported by wagons, sledges and carts over 200 miles of mountain trails to Kachuga, then down the Lena River by barges to the Vitim River, where the load was transferred to small boats and canoes for a 2,000-mile journey to Bodaibo. From that place a narrow gauge railway was built to carry it a further 11 miles to its journey's end. The time occupied by this great journey, including the erection of the dredge ready for work, was 18 months.

A Mobile Fire Pump

The lower illustration on this page shows a fine mobile fire pump of a type now used in large numbers in the A.R.P. fire-fighting service. It is manufactured in two sizes by Worthington-Simpson Ltd., Newark-on-Trent, and consists of a pumping unit driven by a Ford petrol engine, which is mounted on a two-wheel trailer. The pump is of an impeller type, and both the suction and delivery openings in the casing are provided with caps for protection when the pump is not in use. The entire pump and engine are enclosed in a pressed steel housing, provision being made for easy access to both units. The trailer is manufactured by Briggs Motor Bodies Ltd., Dagenham.

South Africa's Biggest Ship Repair Job

The biggest ship-repairing job ever tackled at Capetown docks was undertaken recently. It was the result of a collision between the liner *"Ceramic"* and the freighter *"Testbank,"* while the former was on voyage to Australia with 300 passengers. Over £50,000 damage was done to the vessels, the *"Ceramic"* receiving an enormous gash in her starboard bow while the *"Testbank's"* bows were crushed and telescoped for a length of over 20 ft.

As much of the damage to the *"Ceramic"* was below water, dry docking was necessary to permit permanent repairs to be carried out. There is no dry dock large enough to take the vessel in South Africa, so only temporary repairs could be effected. This was done by fixing cement boxes inside the hull to stop the leaks and make her sufficiently seaworthy to continue her voyage. In the case of the *"Testbank,"* however, a new bow was built on the damaged hull. This meant rebuilding practically the whole of the ship from the break of the forecastle to the bows, the biggest job ever done in a South African port. Over 200 tons of new steel were required for the work, for the only part of the old bow salved from the scrap was the stempiece. This is 74 ft. long, and is made in two sections, one 50 ft. long and the other 24 ft. Although several inches thick and weighing many tons, this massive steel bar was almost tied in knots by the force of the collision. It was straightened in a local engineering shop and is now practically as good as new.

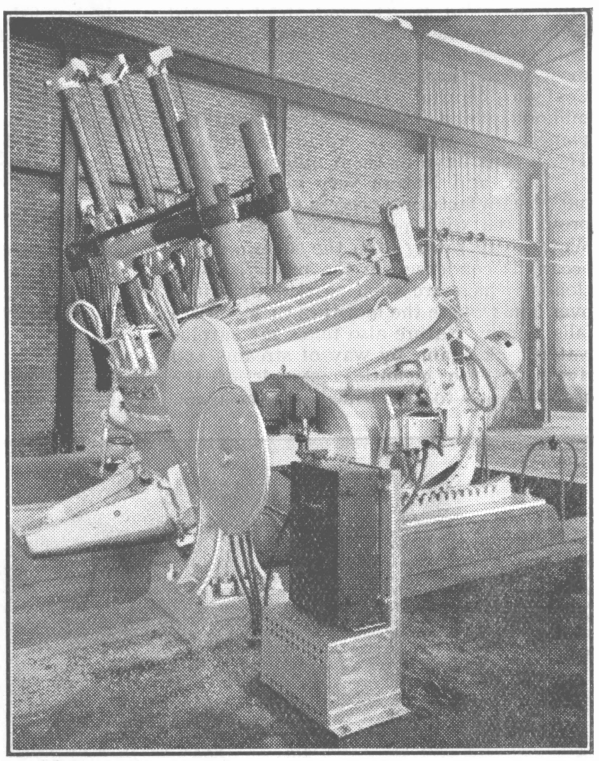
Lloyd's Register Scholarship

The General Committee of Lloyd's Register of Shipping offer a scholarship, valued at £100 per annum and tenable for three years, to be awarded in May, on the results of a competitive examination to be held by the Institute of Marine Engineers. The scholarship is intended to assist marine engineering students to take a university course in engineering subjects. The age limits for candidates are 18 years to 23 years, and the closing date for entries is April 8th, *"M.M."* readers who would like to have further particulars should make application to the Secretary, The Institute of Marine Engineers, 73, Amersham Road, High Wycombe, Bucks.

New Arc Melting Furnace for Johannesburg

The illustration below shows a large electric furnace installed at the Chamber of Mines Steel Products Limited, Johannesburg, where it is used for melting steel scrap such as wheels, worn-out rock drills and steel cables collected from the various mines owned by the company. After melting, the scrap is poured into billets for conversion into new products.

The furnace was supplied and installed by Birmingham Electric Furnaces Ltd., and is one of the firm's standard range of Birlec-Lectromelt furnaces. It operates on a supply of 3,600 kVA at 2,000 v., and has a capacity of 190 cu. ft., which allows for a charge of about 8 tons of scrap. The time required to melt a cold charge of scrap to a clear bath, with the furnace already hot, is approximately 1½ hrs. The melting chamber has a large water-cooled door for charging and removing slag, and this is opened and closed by compressed air mechanism.

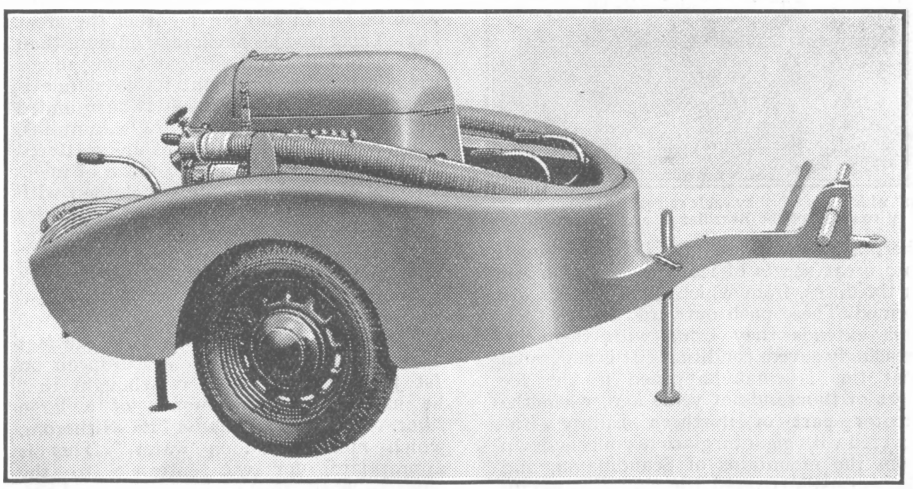


An electric arc furnace for melting steel scrap from South African mines. Photograph by courtesy of Birmingham Electric Furnaces Ltd.

The main feature of the furnace is that it is charged from the top by means of a bucket provided with a drop bottom. This means that the scrap need not be broken into small pieces to pass through the door. The roof is lifted and swung aside by means of a hydraulic ram. When it is lowered after charging, it is securely attached to the furnace casing by clamps, and the ram is disengaged.

The furnace is heated by three graphite electrodes, each 10 in. in diameter. These project through the roof of the chamber and are automatically moved towards or away from the metal bath to maintain the required power input.

The mechanism by means of which the furnace is tilted for pouring is designed to maintain the stream of metal from the spout in approximately the same vertical line thoughout the pouring operation, so that there is no need to move the ladle.



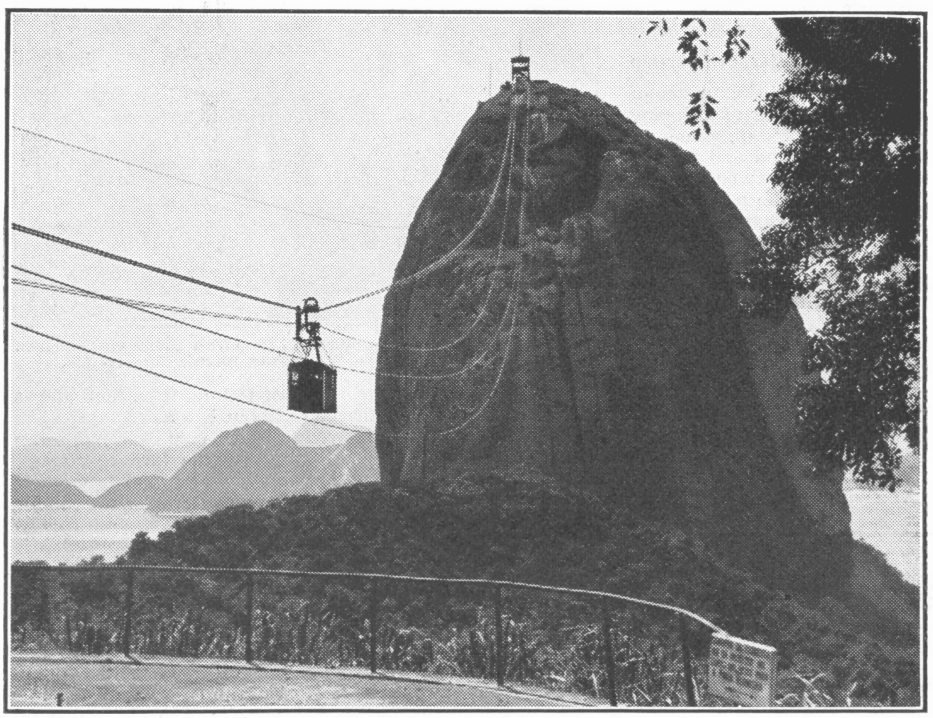
A mobile fire pump of the type referred to on this page. It is a product of Worthington-Simpson Ltd., Newark-on-Trent, to whom we are indebted for our photograph.

Of General Interest

Nature's Storehouse

Most of the important industrial chemicals of to-day can be traced back to only 34 raw materials. The three that are most often used are water, air and coal, which are the sources of nylon, the new material from which textile fibres of surpassing strength and elasticity can be built. Then follow sulphur, salt and limestone, and a further group of materials often required by the industrial chemist includes petroleum and natural gas.

It is fortunate that the three materials most often employed are easy to obtain. Coal is plentiful; there are about 550 million million tons of air around our planet, and water is equally abundant. The oceans have in them millions of tons of water, and Nature very kindly carries out a manufacturing process of her own to provide us with pure water from them. Water evaporating from the surface of the oceans is condensed in the upper air into clouds, which are then carried by winds over lands where the moisture they contain falls as rain. Nature also takes the surplus water back again, by way of streams and rivers, to the gigantic reservoir of the oceans, ready to be purified all over again.



The Sugar Loaf Mountain, Rio de Janeiro, Brazil, the summit of which is reached by cable railway. This photograph and the lower one on the opposite page are reproduced by courtesy of the Brazilian Consul, Liverpool.

Warm Water for Fishes

It seems that fish grow faster in warm water. This has been discovered in experiments carried out in Quebec, where young salmon put on the growth of three or four years in two summers when the water in which they lived was warmed. In these experiments the central heating system for the fish was fitted up in the late winter and early spring months, when the young fry normally make practically no advance; and it was found that they began to eat heartily and to grow correspondingly as soon as the more congenial conditions were introduced. The warm water was circulated in troughs passing on the way through jacket heaters, and fresh water was added continually. The fish were raised for the purpose of stocking Quebec streams.

The plan has been so successful that it is to be introduced at a new hatchery in Canada, so that it will be possible to put larger fish into the rivers at an earlier time than formerly was possible.

Icing Up as Sun Grows Hotter

The Sun does not appear to remain constantly at the same temperature, or even to be steadily if slowly cooling. Instead there seems to be a regular cycle of change, with periods during which the Sun is getting hotter.

We derive our heat from the Sun, but the strange idea has been suggested that as the Sun gets hotter the Earth becomes colder. The explanation lies in the fact that an increase in the amount of heat radiated by the Sun speeds up the evaporation of water from the oceans, so that clouds become more plentiful and rain becomes abundant. In the Polar regions the rain falls as snow, and is packed down into great sheets of ice, thousands of feet in thickness, from which huge glaciers are formed. These push outward, and as their area extends they bring with them increasingly severe conditions. It is suggested that this is what happened in the Ice Ages of thousands of years ago, when the greater part of northern Europe was covered with gigantic glaciers pouring down from the mountains of Scandinavia, and glaciers even covered the slopes of mountains in what are now tropical regions.

A Flying Submarine

So far flying submarines, vessels equally at home on the surface of the sea and below it, as well as in the air, have been met with only in story books. Now comes a report that a craft of this kind has been invented and demonstrated in Japan.

The hull of the submarine is of the usual shape, but on each side there are four bands of steel that are opened out when the vessel is to be flown, forming wings with a span of 54 ft. to 60 ft. At the same time two propeller blades are moved out of slots and joined to form the airscrew. It is said that only six minutes are required for the conversion, after which the vessel is capable of taking off and flying like a seaplane after gliding a short distance on the surface.

Bacteria that Eat Steel

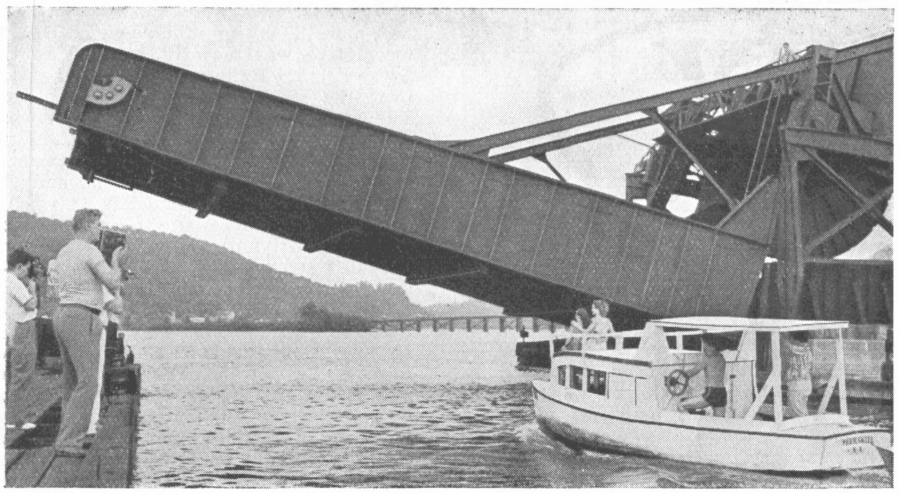
Iron and steel do not sound to be palatable foods, but there are living creatures that thrive on them. These are bacteria of the kind that live in an atmosphere containing no oxygen. They feed on iron and steel pipes buried underground, and are so voracious that they cause rust and corrosion damage amounting to millions of pounds a year. Once they have taken hold of a pipe its life can be put at from seven to ten years only.

A Wonderful South American Bay

The Sugar Loaf Mountain in the bay of Rio de Janeiro, which is illustrated on this page, rises sharply out of the water to a height of 1,260 ft., and provides a vantage point from which one of the most beautiful panoramas in the whole world can be seen. There is a story that it was first climbed by an English sailor, who made his way up its steep sides by driving iron spikes into the hard rock and mounting it with their aid. To-day anyone can reach the summit of the mountain without difficulty by making use of the cable railway that reaches to its crest. This makes the ascent in two stages. The first carries passengers to the summit of a lower hill, where there is a restaurant, with other attractions, and a short walk over this hill brings visitors to the foot of the second stage.

When the second part of the ascent is completed the visitor sees on one side the Atlantic Ocean and on the other the great bay. This provides anchorage of more than 50 square miles and without taking minor irregularities into account its coast line is over 60 miles in length. It is surrounded by a picturesque cluster of mountains, while islands of varying sizes are scattered over its surface. There is a maze of inlets and outlets, and the hills are clothed with vegetation. The city of Rio de Janeiro itself is on the western shore of the bay. Its position is a magnificent one, with hills running down to the beach, and gardens occupying the low ground between the heights.

The bay derives its name from the fact that it was first seen by a European on 1st January. Its discoverer thought that he had entered the mouth of a large river. Its Indian name is Nitherohi, which means "hidden water." This is appropriate, for the entrance to the bay, beneath the majestic Sugar Loaf, is only 1,700 yds. wide.



The start of a pleasure trip that cost a railway £200. To allow the passage of the launch the track over the bridge had to be taken up and relaid twice. Photograph by courtesy of "The Railway Gazette."

A Costly Motor Launch Trip

The New York Central Railroad recently found it necessary to take up 240 ft. of their main line track and relay it twice, to allow a lifting span bridge to be raised so that the owner of a motor launch could go for a pleasure trip on the Hudson River. In *"The Railway Gazette,"* from a recent issue of which this story is taken, it is said that the cost of this work was about £150.

The scene of this extraordinary event was a creek, running into the Hudson River, over which the track is carried by the bridge. Until about eight years ago tugs and barges passed up and down the creek on their way to and from a quarry. The quarry became exhausted, and as the bridge was no longer opened for water traffic, ordinary double line track, unbroken at the ends of the span, was laid over it. Then the owner of *"Dottie,"* a 22-ft. motor launch moored in the creek, requested the War Department, which controls all navigable waters in the United States, to have the bridge opened for him twice on a certain date. It seems that he was exercising a right, for the railroad was ordered to make the necessary arrangements. The track was lifted and the bridge raised for him at 10.30 in the morning, and the rail then had to be relaid immediately, as the *"Empire State," "Mohawk"* and *"Knickerbocker"* expresses, three of the most famous trains of the New York Central Railroad, were due to pass over the bridge. The engineers in charge and the gang carrying out the work had to stand by in readiness to do the work all over again at 1.30 p.m., when the motor launch returned!

Farms where Snakes are kept

The Brazilian snake farm illustrated on this page is a world-famous source of antitoxins for warding off the effects of poisoning by snake bite. We in this country run practically no risk of this kind, but snakes are a menace in many other parts of the world, such as Central and South America, India and even in parts of the United States. Not long ago it was stated that about 20,000 fatal cases of poisoning from the bite of the cobra and other snakes occurred in India every year. In the West Indies there is the dreaded fer de lance, which finds cover and protection among the canes of the sugar plantations, in Africa there is the dreaded black mamba and other deadly snakes, and in the United States there are rattlesnakes and copperheads, although these are steadily disappearing.

Poisoning from snake bite is swift and relentless, and the only effective remedy is an antitoxin prepared from the venom of the snake itself. At the snake farm in Sao Paulo and in others established in South Africa and elsewhere the snake that is to yield its venom is pinned down by means of a long stick and is grasped firmly behind the head. This infuriates the creature, which is then made to bite a thin cloth stretched over a container while the poison sacs are pressed to force out as much venom as possible. The venom is diluted and treated to yield the invaluable antitoxin, which has to be applied with little delay if it is to be successful.

As our photograph shows, the snakes in such farms are housed in small huts or pits on grassy plots surrounded by moats, which the snakes themselves cannot cross. The men who work among them are protected by thick boots and clothing, and the fearlessness with which they venture among their dangerous charges provides one of the greatest thrills for visitors.

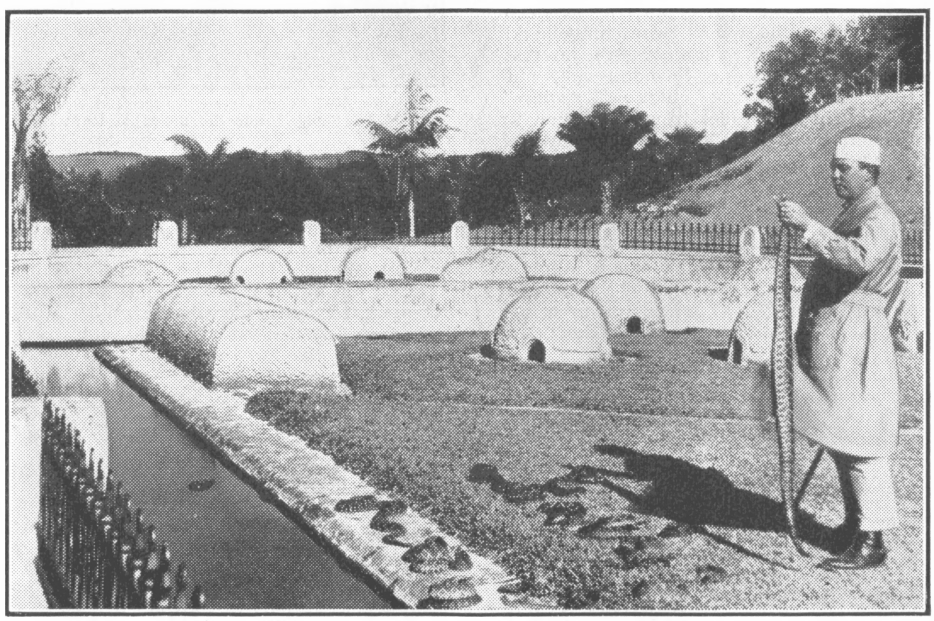
What happens to Salvaged Waste Paper

Since the war spread itself over Northern Europe and so cut off large supplies of wood pulp from which to make paper, we have all been saving clean newspapers and wrappings for salvage. Many of us may have wondered exactly what happens to the paper collected in this manner. It is first sorted and the different kinds are then baled for despatch to the paper mills. There it is further graded, and is then fed into beaters in which it is broken up with water. A proportion of new wood pulp is then added and the mixture, sometimes known as "porridge," is run on to the paper machines. There the water flows away and the mass of fibres is left matted together to form paper. Some of the waste material is employed in the production of cardboard, and all of it can be used again and again if it is kept clean and returned for salvage instead of being destroyed.

Screwdriver that picks up its own Screws

The ordinary screwdriver meets the needs of most of us, and where there are numbers of screws to be driven in, and time is all important, it is easy to make use of a power screwdriver. This is a handy portable tool, electrically driven, that turns the screw and drives it "home" in a fraction of the time that would be required if an ordinary screwdriver were used. Now the efficiency of power screwdriving has been increased still further by the introduction of a tool that first picks up its screw. The pick-up of this screwdriver has slots cut into it so that it may be said to consist of fingers. These are opened by pressure on the screw that is to be picked up, and a spring then causes them to close upon the head of the screw and hold it firmly.

An important part in this process is played by a special tray that holds the screws. The tray has cut in it a series of parallel slots, and it is mounted on springs fixed to a base. The screws to be used are dropped on to the tray and on shaking this they become suspended in the slots by their heads, which thus are placed ready to be seized by the screwdriver. The gentlest pressure only is needed.



A snake farm in Sao Paulo, Brazil, where serums for treating cases of snake-bite are prepared from venom.

RAILWAY NEWS

An "Aircraft" Locomotive at Work

Several interesting features were attached to a recent journey I made from South Wales to London, not least being the identity of the engine, No. 5079 *"Lysander,"* one of the 4–6–0 "Castle" series which have lately been renamed after famous types of R.A.F. and Fleet Air Arm aircraft. With a load which over various sections of the journey ranged from 403 to 418 tare tons, representing a maximum of about 445 tons loaded, *"Lysander"* had to undertake one of the longest through engine-workings on the G.W.R., since this particular train, the Sunday morning express from Fishguard, follows during the winter months—as was the practice before the war—the older route via Chepstow and Gloucester, involving for the engine a Swansea-Paddington journey of 216¼ miles instead of the normal 191 miles via Badminton.

For the 44½ easily-graded miles along the banks of the Severn from Newport to Gloucester, the public timetable generously allows 70 min., and over this attractively scenic course *"Lysander"* won back most of a late start from Newport by virtue of a gross time of 62½ min.; allowing for two permanent way slacks, one very severe, and a signal check, the net time for the 44½ miles was about 56 min. In addition there was a service slack to about 30 m.p.h. over Brunel's ingeniously-designed Wye Bridge at Chepstow, while on the favourable gradients the speed was carefully restrained to the war-time maximum of 60 m.p.h.

The provision of a 2–6–2 T as pilot to help the train engine haul its 15-coach load up the 4-mile bank, partially as steep as 1 in 60, between Brimscombe and Sapperton Tunnel, took most of the interest out of the Gloucester-Swindon run, but after shedding the pilot *"Lysander"* covered the 17.2 miles from Sapperton to Swindon in the fair start-to-stop time of 22 min. 22 sec., with a maximum of 65 m.p.h. Beyond Swindon a clear road could not be obtained until a laggard freight train had been shunted clear at Shrivenham, after which *"Lysander"* "revved up" and covered the 38 miles from Marston Crossing Box to Reading in 44¾ min. start to stop, average 51 m.p.h., or in a net time of about 43 min., as we were badly checked in from Tilehurst.

A noteworthy feature of this part of the run was the quite remarkable accuracy with which the driver stuck to his mile-a-minute maximum, the 25 miles from Uffington to Pangbourne being covered in 25 min. 8 sec. pass-to-pass, with no greater variation in speed than from 59 to 62 m.p.h.! Finally, the 35.5 miles from Reading to a signal stop outside Paddington were run in 43½ min., compared with an allowance for the full 36 miles of 47 min.

D. S. BARRIE

New Railcars for New Zealand

There have recently been completed in English works 10 notable railcars with Diesel propulsion for main-line work on the New Zealand Government Railways, which are still in an active stage of development. The gauge is 3 ft. 6 in. The handsome cars are 66 ft. long, weighing 40½ tons with a full complement of passengers, crew and fuel, carried on 12 wheels. Seating is provided for 52 passengers in two saloons, separated by an entrance vestibule, in addition to engine room, luggage compartment and lavatory. Welding has been largely employed in the steel construction.

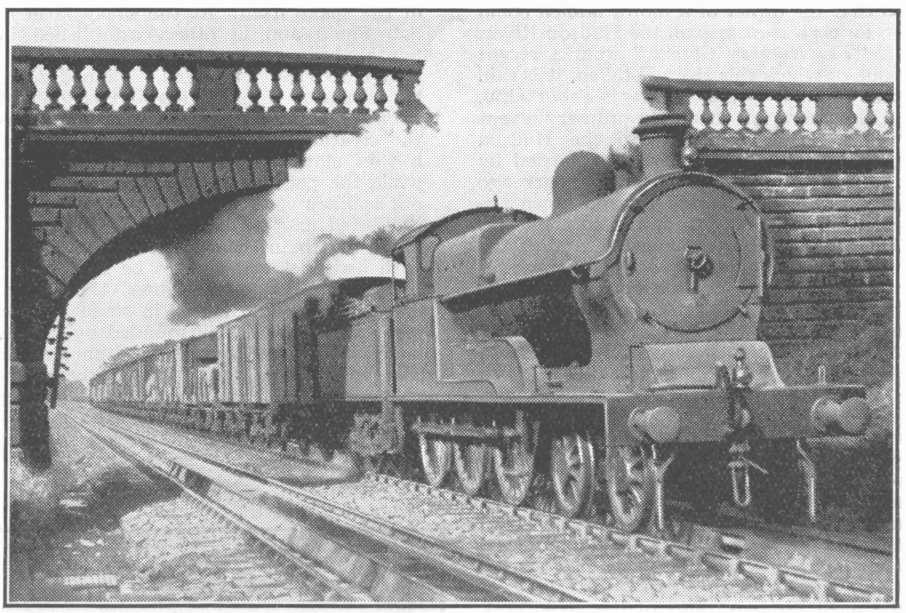
The engine is of the six-cylinder vertical four-stroke water-cooled type, and drives by means of a five-speed gear-box and cardan shafts. The Westinghouse compressed air brake is fitted and there are air-operated entrance doors. With the doors are interlocked steps that may be lowered by the movement of a lever, to admit of entraining or detraining at halts not provided with platforms, only when the doors are opened and the car is stationary. Interior heating is effected by means of units utilising hot water drawn from the engine cooling system, and the whole equipment is exceedingly modern and complete. These cars have been proved capable of a notable turn of speed during the test runs that have been made, a maximum of 76 m.p.h. having been attained in the course of these.

Swiss Electric Locomotive Development

A new 12,000 h.p. double-ended electric locomotive was recently supplied to the Swiss Federal Railways for heavy haulage over the steeply-graded Gotthard route. Though more powerful, it is in many ways similar to the double giant No. 11851, which was built in 1931 and has been in regular service between Lucerne and the Italian frontier. Each half has 14 wheels, and the two halves are always coupled together, driving compartments being provided at each end. The total weight is approximately 244 tons.

Two overhead pantograph collectors of Swiss standard pattern pick up current at 15,000 v., and this is led to the two transformers through a circuit breaker. The motors are arranged transversely to work in pairs. Eight sets of motor equipment are required for development of full power output, which enables the engine to haul express trains weighing as much as 600 tons up gradients as steep as 1 in 38 at a maximum speed of approximately 40 m.p.h. Remarkable work indeed! Freight trains up to 750 tons weight can be worked up the same climbs at about 30-31 m.p.h.

Another feature of Swiss electric passenger services has been the recent development of fast, light-weight rail cars, three-car articulated sets, and "locomotive vans" for hauling short trains at comparatively high speeds. These vans have mail, luggage and lock-up compartments in addition to those housing the driving and electrical gear.



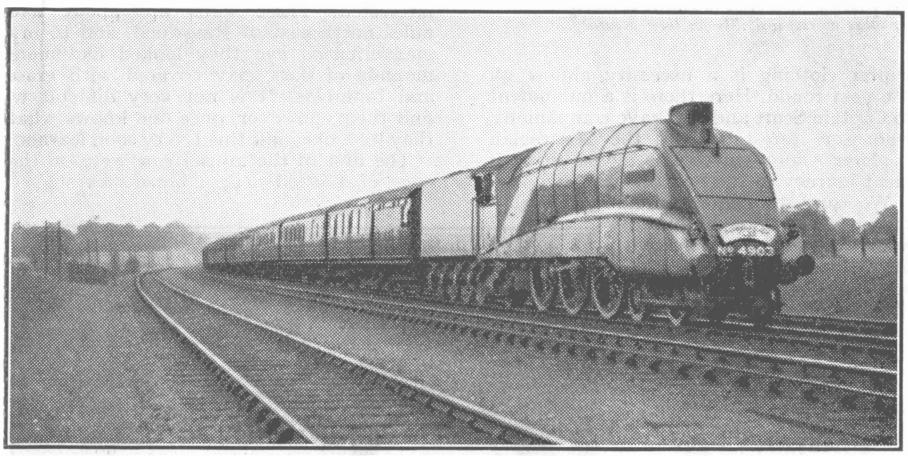
L.M.S. No. 5487 "Combermere," a former L.N.W. engine of the "Experiment" class. This engine was withdrawn in 1934. The "bulge" under the smoke-box door was known as the "piano front." Photograph by W. S. Garth, Luton.

Powerful Canadian Mixed Traffic Engines

To meet increasing wartime demands on Canadian main lines, a series of exceedingly large and powerful 4–8–4 locomotives of the "6100" class are being placed in service. These are capable of handling on suitable grades 100 cars of freight or 15 to 20 passenger vehicles at speeds up to an average of 55 m.p.h. They are fitted with mechanical stokers, large superheaters, feed-water heaters and roller bearings. The total weight in working order is 343 tons and the overall length of engine and tender 94 ft.

Scarborough Line Running

The 42 mile branch connecting the East Coast main line at York with the famous resort of Scarborough and the coast lines radiating therefrom is peculiar in that all



The up L.N.E.R. "Scarborough Flyer," non-stop York to King's Cross, hauled by No. 4903 "Peregrine," a streamlined "Pacific," which is fitted with a double chimney.

but two of the intermediate stations have been closed to passenger traffic which is diverted to buses operating on adjacent roads. Parcels and freight however are still dealt with by trains that stop as required, running for these traffics mainly in the early morning. The country is entirely rural and sparsely populated. During the busy summer season in normal times it is thus possible to operate the whole of the heavy holiday traffic at approximately the same fast speed with less risk of signal delays. An interesting variety of engines and rolling stock traversed the branch and doubtless will again when peace returns. Over the major portion gradients are very slight, and 50-min. non-stop expresses were numerous, including the summer *"Scarborough Flyer"* to and from London.

A typical current run behind No. 226 *"The Bilsdale,"* one of the "Hunt" class 3-cyl. 4–4–0 engines, hauling six coaches weighing 200 tons, gave a time of 28 min. to the first stop at Malton. This was the peacetime allowance for the 21¼ miles from York and 2 min. faster than the present schedule. The maximum speed was 63 m.p.h. on the slight descent past Barton Hill, while along the considerably curved Castle Howard section, with its pretty scenery, where a speed restriction of 45 m.p.h. applies for a considerable distance, the minimum was down to 38 m.p.h. From Malton, which is practically half-way, the 18 miles to passing Seamer, the only other "open" station, on a fairly level road took only 20¾ min. and the 21 miles into Scarborough with an uphill finish occupied 24¾ min. Thus fully 2 min. had again been gained with a maximum speed of 63 m.p.h. and most of a late start had been recouped.

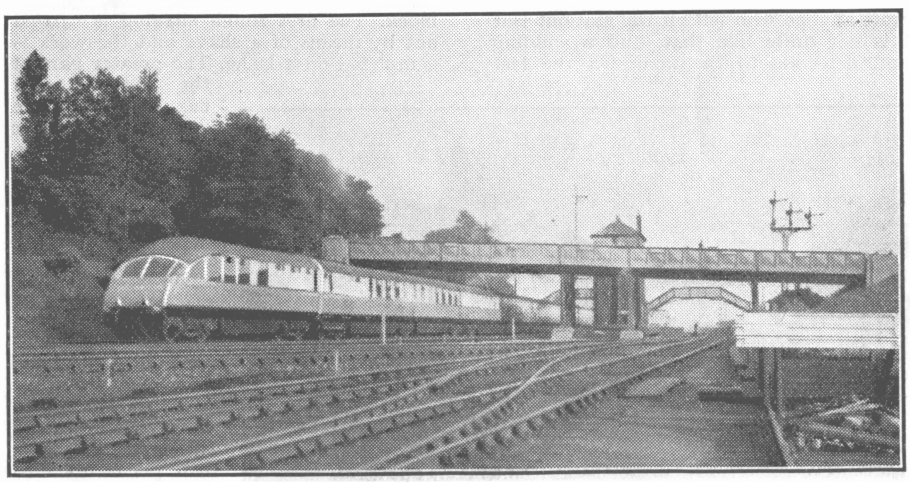
With a heavier nine-coach 300 ton train, one of the early N.E.R. two-cyl. Atlantics of Worsdell's "V" class, now L.N.E.R. "C6," took practically the full 30 min. to Malton, speed not rising above 55 m.p.h. The second stage for which 29 min. are allowed, was covered in 27½ min. however, with steady running not exceeding the mile-a-minute rate.

* * * *

The freight cars owned by the United States railways joined together would make up a train nearly 13,300 miles in length.

London Transport Food "Specials"

As many as 100,000 to 150,000 persons often take shelter for the night in the deep-level tube stations of London spread over a wide area, during the present turbulent conditions. Elaborate arrangements have had to be devised for the regulation of this large scale dormitory activity, while at the same time maintaining early and late train services. At many stations in the evenings and early mornings the London Passenger Transport Board have undertaken the provision at popular prices of tea, cocoa and milk, served into shelterers' own mugs only, and simple food from portable cans and baskets. Special refreshment supply trains run in the early afternoon to deposit dustproof fibre containers of provisions at the stations that have "feeding points," at the same time collecting the empties from the previous night. In order to interfere as little as possible with the normal frequent passenger service, these unique specials on an urban tube line are only allowed about 30 seconds at each halt.



L.N.E.R. up "Coronation" express passing through Co. Durham at speed showing observation car in rear. Photograph by W. B. Greenfield.

More "Hall" Class Locomotives

Further new "Hall" class 4–6–0 mixed traffic locomotives noted on the G.W.R. are No. 6906 *"Chicheley Hall,"* No. 6907 *"Davenham Hall,"* No. 6908 *"Downham Hall,"* No. 6909 *"Frewin Hall,"* and No. 6910 *"Gossington Hall."*

A USEFUL CRGSS-COUNTRY LINK

A timetable event of the New Year has been the introduction of a through buffet car daily service between Newcastle-on-Tyne and Ashford, Kent, via Sheffield, Leicester, Banbury, Reading, Guildford, Redhill, Tonbridge, avoiding the necessity of crossing London. The stock is provided on alternate days by the S.R. and the L.N.E.R. A section of the G.W.R. is also traversed, that company taking a share in the provision of locomotive power.

ADDITIONAL S.R. RESTAURANT CAR SERVICES

In order to meet increased requirements, dining cars are being run through daily for the first time in winter between Waterloo and Ilfracombe, and between Waterloo and Plymouth via Okehampton and the north side of Dartmoor, over former L.S.W.R. metals. The through Brighton-Exeter-Plymouth daily service has also had its restaurant car restored. Pullman refreshment cars are attached to nearly all the principal trains on the Eastern and Central Sections of the S.R., as well as to some of the semi-fast services.

NEW EXPRESS TANK ENGINE PERFORMANCE

Ten years ago Sir Nigel Gresley introduced on the L.N.E.R. a powerful 2–6–2T three-cylinder design, now forming the "V1" class, principally for outer suburban work in the Edinburgh-Glasgow areas. During a month's trial at King's Cross shed, London, however, No. 2911 of this class proved herself capable of working speedily and economically semi-express Cambridge and other main line trains running 40 to 60 miles in the course of a single trip. Later locomotives of the type now work considerable distances on the Great Eastern section as well as regularly handling passenger trains in the North Eastern district.

As announced in these columns, a new "V3" edition of the type has been put to work. This has a boiler pressure of 200 lb. per sq. in. compared with the 180 lb. per sq. in. previously standard, and there are 10 engines numbered between 390 and 401 in service on the Newcastle-Middlesbrough and Newcastle-Carlisle buffet expresses, which make several stops with heavy corridor stock. The second of these, a famous cross-country route, is 60½ miles each way, and on an eastbound journey the pioneer "V3" No. 390 had a load of 7 cars weighing 235 tons empty or about 260 tons gross on the 7.0 p.m. ex Carlisle.

Up the four miles, mostly at 1 in 107, after getting away over the curves and junctions outside Carlisle, speed ranged from 37½ m.p.h. to 31 m.p.h., rising to 43 m.p.h. on the easier 1 in 295 before Brampton stop. Restarting on the 1 in 128 rise 31 m.p.h. was attained; but on a more level stretch through fine Border scenery the rate of travel quickly rose to 57 m.p.h. before Gilsland halt. The next stage on to Haltwhistle is very sharply timed, as only 7 min. are allowed for 5.3 miles, and half a minute was lost in spite of a rapid start down the 1 in 311 and a maximum of 61½ m.p.h. Getting away again there was a fast run along the Roman Wall country past Bardon Mill and Haydon Bridge, with a maximum of 71 m.p.h.; and although speed had to be reduced to 20 m.p.h. for a p.w. slack, Hexham was reached in 19¼ min. actual, or 18 min. net, compared with an allowance of 21 min. The average speed start-to-stop over this section was 54.4 m.p.h.

The remaining portion of the run is easy but winding, so that several slowings were enforced; yet the 17-mile stage on to Blaydon, where industrial areas appeare was covered with more than a minute to spare. On arrival in Newcastle the new tank engine had about 4½ min. to her credit with this 260-ton train on the by no means easy overall booking of the run, which had hitherto been performed by 4–4–0 tender engines of the "Shire" or "Hunt" type. Water was taken once on the way, at Hexham, and the driver was evidently pleased with the locomotive's performance and power.

From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

Norway's Highest Railway Station

On this page is a picture of the railway station at Finse, in Norway, the highest station on the amazing railway that crosses the Norwegian mountains on its way from Oslo to Bergen. It stands 4,008 ft. above sea level and, apart from the termini of the rack and pinion lines of the Alps, is thought to be the highest station in Europe. It was raided by the R.A.F. in the attack on the Bergen-Oslo railway towards the end of last year.

I have travelled on this wonderful line for 60 miles from Voss to Haugastol, starting at a height of 185 ft., surmounting the summit at 4,267 ft. and de-training at 3,240 ft. above sea level. A feature of the line is that it crosses the mountains rather than tunnels through them. There are tunnels, of course, 178 of them, with a total length of 23 miles. The longest is 3 miles 514 yards in length, between Upsete and Myrdal, and it took 12 years to bore.

We placed our bicycles in the van, and immediately the train began to climb, snorting heavily on the tortuous slopes. For 60 miles of its route the line is above the level of the pine trees, and for 30 miles no trees are to be seen at all, even the hardy birches failing to survive at the height reached. Great screens have been erected to prevent drifts and so ease the work of the snow ploughs, and long tunnels of staunch timber have been erected to keep the line free from snow. The Norwegian authorities have very effective rotary ploughs, but prevention is better than cure.

At Myrdal we looked from the station platform, down over a precipice, thousands of feet below, where a lake seemed to await anyone who fell off the station! But it is not quite like that, and a winding road descends to the lake. On the last climb to the summit the train makes great loops as it finds the easiest way across the mountains, and at times it is almost possible to see the front and rear ends of the train at the same time.

Finse, the highest station on the railway between Oslo and Bergen, in Norway. Photograph by F. Marriott, Birkenhead.

At Finse there is always snow, and winter clothing is a necessity almost all the year round. Here there is a monument to Captain Scott and his brave companions, who were forestalled by the Norwegian explorer Amundsen by one month in their great journey to the South Pole.

We came to Haugastol in the early afternoon, and there we left the train on its descent to Oslo, while we cycled across the mountains to the little village of Vik-i-Eidfjord, at the inner end of the great Hardanger Fjord.

F. MARRIOTT (Birkenhead).

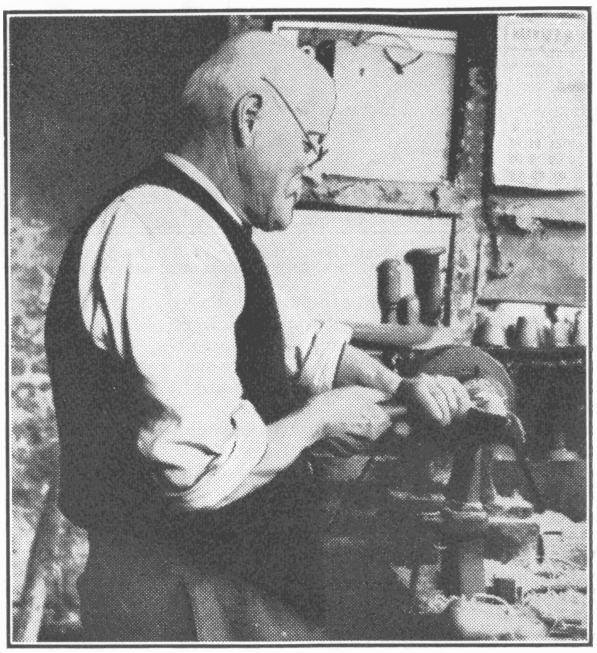
Making Imitation Pheasant's Eggs

Mr. W. H. Bailey is one of the few wood turners in the country who still do all their work by hand, and he is perhaps the only man living whose main business consists in making imitation pheasants' and partridges' eggs. When I visited him in his little workshop at King's Cliffe he was busily engaged on an order for 12 gross of pheasants' eggs. Mr. Bailey, who was 73 last October, began work when he was 15, and since then he has been engaged continuously as a wood turner, except for a period during the last war.

Sycamore is the wood used for making these imitation eggs. The tree branches are first sawn into suitable lengths on sawing trestles, after which they are split lengthwise on the block. The first rough shaping is carried out by means of a shave and the work is completed on a lathe. The greater part of the actual wood turning is done during the warmer months of the year. When the colder weather arrives the imitation eggs are hand painted by Mr. Bailey at his home. The eggs receive two coats of paint and when finished it is difficult to tell them from the real eggs.

The eggs that Mr. Bailey makes are used to deceive hen pheasants into believing that they hatch out their own eggs. These are placed under broody hens, the hen pheasants in the meantime sitting on the wooden imitations, and only receiving their own eggs when these are ready for hatching out. In this way a larger proportion of young pheasants can be hatched out and reared.

J. W. MORTON (March).



Giving an imitation pheasant's egg its final shaping on the lathe. Photograph by J. W. Morton, March.

A Visit to some Romano-British Pottery Kilns

When friends of mine suggested that we should visit some early Roman pottery kilns in the New Forest I was greatly interested. These kilns are about five miles north east of Ringwood, and to my inexperienced eye they looked like mere mounds of dark clay covered with grass and brambles. It is not very difficult to find them, however, once one knows what they look like, and this I very soon learned.

The first of the kilns I saw were on the edge of a wood near a horse-shoe shaped hollow that was used as an apiary by the early Britons. The hives were placed in rows, one behind the other, all the way round the bank. The hollow faces south, so that the hives were splendidly placed in a veritable sun trap.

The pottery found at these kilns is very simple, and is without ornamentation. Evidently the clay was not very good here, since the products were mainly bowls and pots just thumbed out and not made on a potter's wheel. About two miles away were more kilns where the pottery was very good, many of the bowls found here having unique designs. The patterns are many and varied, some being just angular markings formed by a stick when the clay was still soft, while others were painted on and glazed afterwards. These latter are very beautiful, some being in the shape of stars and half-moons, and others of interwoven flowers.

Flagon spouts, cup handles, lids and cooking dishes can be found in addition to bowls. The cooking dishes were reinforced with flints to give them strength to stand up to the strain of the baking in ovens to which they were subjected.

Good examples of all these things can be dug up easily, and recently there have been extensive excavations in the district, in the course of which many complete bowls were found. Some of these actually had on them the fingerprints of the workers of nearly 2,000 years ago.

M. A. GLENNIE (Oundle).

New Meccano Models

Fine Subjects for Outfits No. 3 and No. 5

THE model tower wagon shown in Fig. 1 is designed for construction from the parts in Outfit No. 5. Construction is commenced by building the chassis. Two 12½″ Strips 1 are joined to the flanges of a 4½″ Flanged Sector Plate and to two 4½″×2½″ Flexible Plates that represent the sides of the bonnet. The front axles are mounted on springs made up from 1½″, 2½″ and 3½″ Strips, bent to the required shape and joined to the chassis at their forward ends by a 2½″ Strip 2, their rear ends being bolted to the Flanged Sector Plate.

The main parts of the steering gear are two right-angle cranks, each formed from two Flat Brackets bolted rigidly at right angles to each other on a ½″ Bolt. This Bolt serves also to attach the crank pivotally to the centre hole of the spring. A similar unit is required at each side of the chassis. The cranks are arranged so that one of their arms lies along the line of the chassis. These arms are joined by a 2½″ Strip that forms the track rod, and the road wheels are mounted on ⅜″ Bolts passed through Angle Brackets bolted to the other arms.

The rear side of the cab is filled in with a 2½″×2½″ Flexible Plate and a Semi-Circular Plate overlapped, and the back is a 5½″×2½″ Flexible Plate. A 2½″×½″ Double Angle Strip bolted between the Strips 1 provides a bearing for the steering column 3, a second bearing being provided by a 2½″ Strip bolted to the upper Flanged Sector Plate. A Bush Wheel 4 on the lower end of the Rod is bolted to a 2½″ Strip that is bent slightly and lock-nutted to the 2½″ Strip of the steering gear.

At the rear the Strips 1 are bolted to a 5½″×2½″ Flanged Plate 5, and two ½″×½″ Angle Brackets bolted to this Plate provide bearings for a 4″ Rod, on which two Road Wheels are mounted.

The fixed portion of the tower consists of four 12½″ Angle Girders bolted to the chassis. Four Flat Brackets held by Bolts 6 are secured to the Angle Girders to form slides for the movable tower.

The tower is raised and lowered by turning a 3½″ Crank Handle journalled in two Flat Trunnions bolted to the chassis. Two lengths of Cord are attached to the Handle, and they pass over 1″ Pulleys mounted on Rod 7, their other ends being fastened to the lower end of the tower.

A pivoted 1″×1″ Angle Bracket 8 has a Threaded Pin secured in one of its arms and the other arm engages a Spring Clip on the Crank Handle. The Angle Bracket is held in position by a 2½″ Driving Band, which is fastened to it and then passed around the Crank Handle.

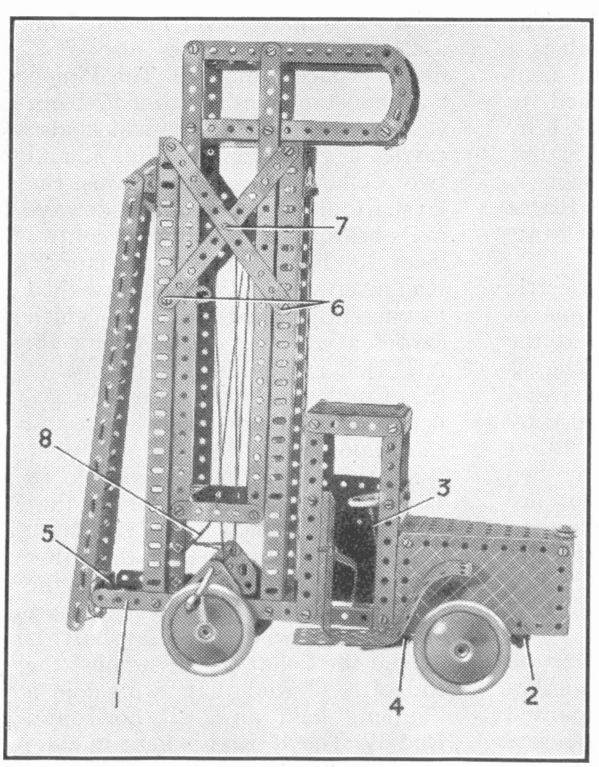


Fig. 1. A working model Tower Wagon designed for construction from parts in Outfit No. 5.

Parts required to build model tower wagon: 8 of No. 1; 12 of No. 2; 2 of No. 3; 11 of No. 5; 2 of No. 6a; 4 of No. 8; 8 of No. 10; 9 of No. 12; 1 of No. 12a; 1 of No. 15b; 2 of No. 16; 1 of No. 19g; 3 of No. 22; 1 of No. 23; 1 of No. 24; 3 of No. 35; 90 of No. 37af; 77 of No. 37bf; 11 of No. 38; 1 of No. 40; 1 of No. 48; 8 of No. 48a; 1 of No. 51; 1 of No. 52; 2 of No. 54a; 4 of No. 90a; 2 of No. 111a; 4 of No. 111c; 1 of No. 115; 2 of No. 126; 2 of No. 126a; 1 of No. 155a; 1 of No. 176; 1 of No. 186; 4 of No. 187; 2 of No. 188; 2 of No. 189; 4 of No. 190; 2 of No. 191; 2 of No. 192; 2 of No. 200; 1 of No. 214.

The amusing model of a barber at work on his "victim" that is shown in Fig. 2, can be built from the parts in Outfit No. 3. It is driven by a *Magic* Motor, and when this is put in motion the barber sets to work in a most realistic manner. The chair is the first part of the model to build. The back and seat are formed of a 4½″×2½″ Flexible Plate bent as shown and attached at one end to the legs by a 2½″×½″ Double Angle Strip. The other end of the Flexible Plate is secured to a 2½″×½″ Double Angle Strip 1, to each end of which a 2½″ Cranked Curved Strip is bolted. A head support is made from a Flat Trunnion which, together with a *Magic* Motor, is bolted to the Double Angle Strip. Two Trunnions are joined to the Flanged Plate to provide bearings for a 3½″ Rod 2. A 1″ Pulley is fixed on one end of this Rod and is connected by a 2½″ Driving Band to the pulley of the *Magic* Motor. At the other end of the Rod is another 1″ Pulley that has a ½″×½″ Angle Bracket 3 secured to its boss by a Nut and Bolt. A ½″ loose Pulley bolted to the Angle Bracket forms a simple cam.

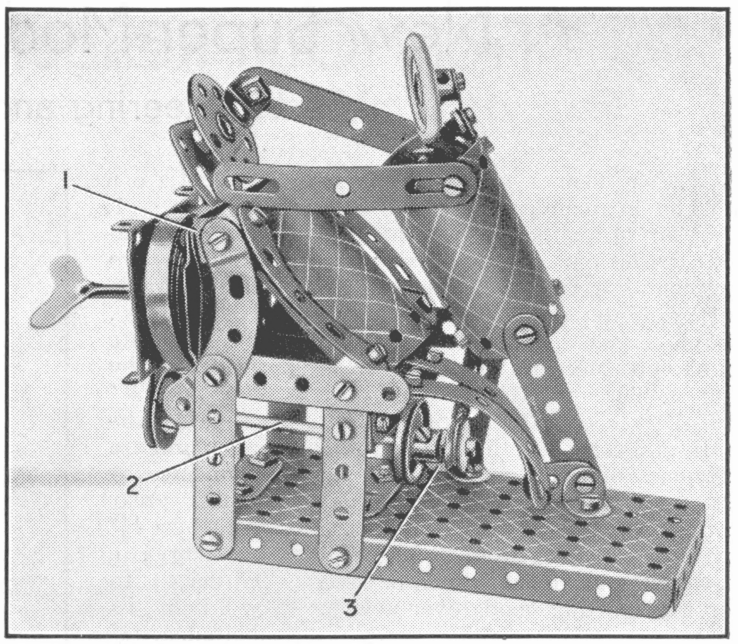


Fig. 2. An amusing model of a barber and his customer. It is operated by a Magic Motor, and can be built from parts in Outfit No. 3.

The arms of the man in the chair are attached by Double Brackets at their upper ends to a 2½″×2½″ large radius Curved Plate that forms his body. The Double Brackets are also bolted to the Double Angle Strip 1. His head is a Bush Wheel mounted on a ⅜″ Bolt inserted in the Flat Trunnion.

The body of the barber is formed by joining together two 2½″×2½″ U-section Curved Plates. To these two 2½″ Strips are then bolted, and they are secured at their other ends to the Flanged Plate by ½″×½″ Angle Brackets and Flat Brackets. Each arm is a Formed Slotted Strip, the right arm being lock-nutted to the body. One end of a length of Cord is fastened to the shoulder end of this arm; its other end is looped and is then passed through a hole in the Strip forming the barber's right leg. The loop must fit loosely around the groove of the ½″ Pulley forming the cam, and the Cord should be tightened so that it raises and lowers the barber's arm when the Motor is set in motion.

The distance through which the razor moves can be increased or decreased by adjusting the length of the barber's right arm.

Parts required to build model barber: 8 of No. 5; 4 of No. 10; 2 of No. 11; 8 of No. 12; 1 of No. 16; 3 of No. 22; 1 of No. 23; 1 of No. 24; 2 of No. 35; 49 of No. 37af; 45 of No. 37bf; 4 of No. 38; 1 of No. 40; 2 of No. 48a; 1 of No. 52; 4 of No. 90a; 3 of No. 111c; 2 of No. 126; 1 of No. 126a; 1 of No. 155a; 1 of No. 186; 1 of No. 191; 2 of No. 199; 1 of No. 200; 4 of No. 215. 1 *Magic* Motor (not included in Outfit).

A New Super-Model Mobile Crane

Castor Steering and Electric Drive

MANY devices have been invented in an endeavour to solve the problem of high speed handling and transportation of materials and merchandise. One of the most popular and interesting of these is the mobile crane that forms the subject of the fine Meccano model shown in Fig. 1. The actual crane is entirely self-contained, with its own power unit, and combines the stability and efficiency of a stationary crane with extreme mobility. Its travel is not confined to a set of rails, or hindered by trailing cables from an external power supply, so that it can be used for transporting goods over a wide area.

The power unit in the model is an Electric Motor, and the luffing, hoisting and travelling operations can each be brought into play by the movement of levers within easy reach of the operator. The crane is slewed by rotation of a pivoted rear castor controlled from the operator's cab.

Construction of the model should be commenced by building the chassis. This consists of two channel section girders 1, Fig. 2, formed from two $9\frac{1}{2}$" Angle Girders. These are bridged by two $3\frac{1}{2}$" Angle Girders, and are connected at their rear ends by a $4\frac{1}{2}$" Angle Girder, to which is bolted a $4\frac{1}{2}$" Flat Girder and two $4\frac{1}{2}$" × $2\frac{1}{2}$" Flat Plates 3.

The front axle 4 is journalled in Handrail Supports secured to built up semi-elliptic springs attached to the chassis, and it carries two 2" Pulleys fitted with Tyres. The front of the driving cab is a $4\frac{1}{2}$"×$2\frac{1}{2}$" Flexible Plate bent as shown and attached to the ends of the girders 1 by two 3" Formed Slotted Strips. At its upper corners it is bolted to $2\frac{1}{2}$"×$2\frac{1}{2}$" Flat Plates fixed to the girders 1 by Obtuse Angle Brackets.

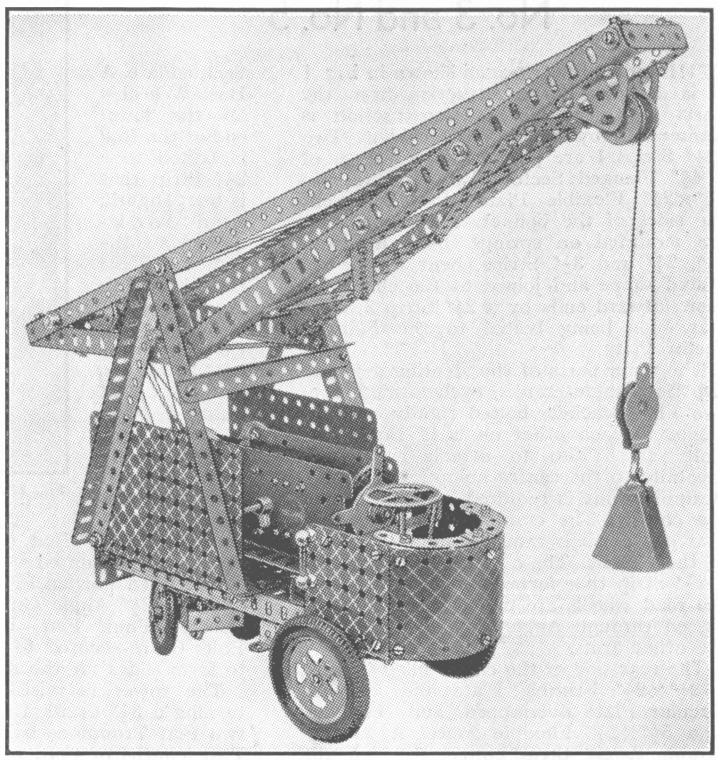


Fig. 1. A general view of the new Super Model Electric Mobile Crane.

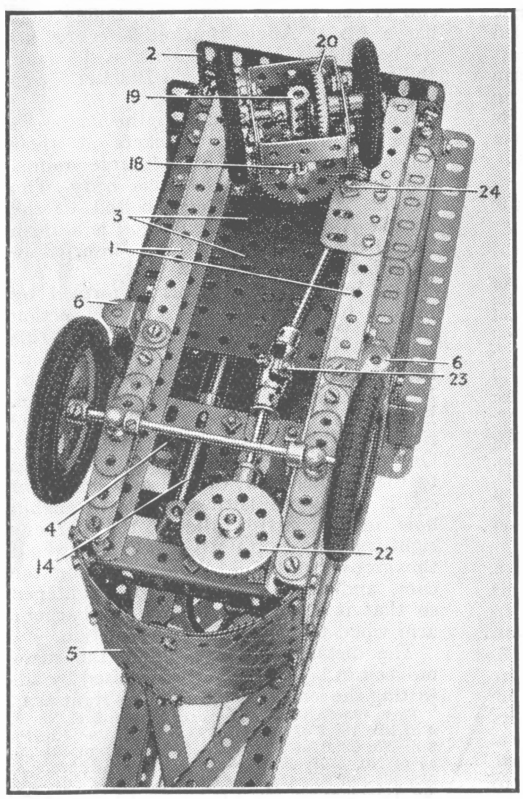


Fig. 2. An underneath view of the Electric Mobile Crane, showing the castor and steering mechanism.

An E6 or E20B Electric Motor is attached to one of the $3\frac{1}{2}$" Angle Girders at the forward end of the chassis by $\frac{1}{2}$"×$\frac{1}{2}$" Angle Brackets, and its sideplates are extended by two $2\frac{1}{2}$"×$2\frac{1}{2}$" Flat Plates that are secured to them by two 1" Corner Brackets but are spaced from them by Washers. The $2\frac{1}{2}$"×$2\frac{1}{2}$" Flat Plates are bolted to two $2\frac{1}{2}$" Angle Girders fixed to the Flat Plates 3.

A Worm on the armature shaft of the Motor meshes with a $\frac{1}{2}$" Pinion 8 mounted on a 2" Rod that carries a $\frac{7}{8}$" Bevel Gear and a Collar. This Rod is journalled in a Channel Bearing 9 bolted to one of the Motor sideplates. The Bevel drives a similar Bevel mounted on a $2\frac{1}{2}$" Rod that carries also a $\frac{1}{2}$" diam. $\frac{1}{2}$" face Pinion 10. The Pinion is in constant mesh with a 57-teeth Gear 11 on a $2\frac{1}{2}$" Rod, which also carries a $\frac{3}{4}$" Pinion 12, Fig. 4, and two Collars. This Rod forms the layshaft and can be moved sideways in its bearings by moving the control lever 13, Fig. 3. The latter is a 2" Rod inserted in a Coupling attached to one end of an 8" Rod 14, which carries at its rear end a Crank 15. A $\frac{3}{8}$" Bolt is fixed in the end hole of the Crank and its head engages between a Collar on the layshaft and the Pinion 12.

At this point it is advisable to assemble the automatic brake that maintains the load when the drive is transferred to operate the other movements of the crane. On the left-hand end of the layshaft is a Collar, and when the layshaft is moved the Collar pushes against the end of a 1" Rod that is fixed in a Coupling held on a 2" horizontal Rod 17. The 1" Rod is kept in close contact with the Collar on the layshaft by a short length of Spring

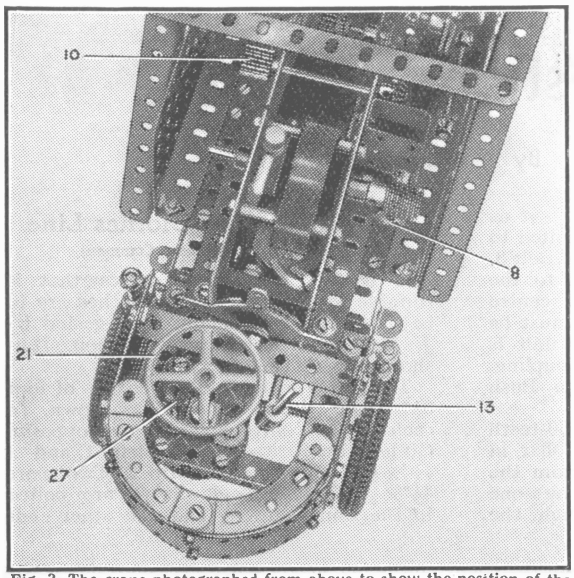


Fig. 3. The crane photographed from above to show the position of the Electric Motor and the control lever.

Cord. Rod 17 is journalled in a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted to the chassis, and is retained loosely in place by Collars at each end. The brake band is a belt of Cord, which passes around a Bolt and around a 1" Pulley on a $2\frac{1}{2}''$ Rod that carries also a 50-teeth Gear 16 and a Cord Anchoring Spring.

The castor unit and its gears are constructed as follows. Two $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strips and two $1\frac{1}{2}''$ Flat Girders are bolted together to form a cage as shown in Fig. 2. Two $1\frac{1}{2}''$ Angle Girders are then bolted to the Flat Girders, and they in turn are attached by means of two $\frac{3}{4}''$ Bolts to a 57-teeth Gear mounted on a Rod 18. The Angle Girders are spaced from the Gear by the length of the Bolts. The lower end of Rod 18 is inserted in the longitudinal bore of a Coupling 19, which is mounted on a $2\frac{1}{2}''$ Rod pushed through its centre transverse bore. Rod 18 carries also a $\frac{1}{2}''$ Pinion that meshes with a $1\frac{1}{2}''$ Contrate 20 on the Rod of Coupling 19. At its upper end Rod 18 carries a $\frac{3}{4}''$ Contrate and is journalled in the Flat Plate of the chassis and a $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip bolted above the Plate.

The castor is steered from the operator's cab. The Steering Wheel 21 is fixed on a $3\frac{1}{2}''$ Rod journalled in a $3'' \times 1\frac{1}{2}''$ Flat Plate bolted to the chassis framework and in a Double Bent Strip bolted above the Plate. A $1\frac{1}{2}''$ Bevel mounted on the lower end of this Rod meshes with a $\frac{1}{2}''$ Bevel fixed on a 2" Rod journalled in $\frac{1}{2}'' \times \frac{1}{2}''$ Angle Brackets, and is connected to a 4" Rod by a Universal Coupling 23. A Worm on the rear end of the 4" Rod meshes with the 57-teeth Gear of the castor unit, and a bearing for this Rod is provided by a Handrail Support 24.

The Pinion 12 on the layshaft meshes with a 50-teeth Gear mounted on a 2" Rod 25 that carries also two Cord Anchoring Springs. A 2" Rod 26 carries two 1" Pulleys, over which the cord for raising and lowering the jib is passed, and also a Flat Bracket that is free to pivot and is held in place by Collars. The shaft 25 is controlled by a foot-brake that consists of a length of cord fastened at one end to the side of the gear-box, then passed around a 1" Pulley fixed on the Rod 25 and finally tied to a foot pedal 27 in the cab. This foot pedal is made up of a Flat Bracket bolted to the centre hole of a Double Bracket, which in turn is pivoted on a Double Bracket fixed to the floor of the cab. The brake cord is attached to the rear of the Flat Bracket.

Each side of the body is a $5\frac{1}{2}'' \times 3\frac{1}{2}''$ Flat Plate bolted to $5\frac{1}{2}''$ Angle Girders fixed to the girders 1. Two $7\frac{1}{2}''$ Angle Girders are arranged to form an "A" frame, as shown, and at their upper ends are bolted to the end hole in the arm of a Crank.

The construction of the jib is quite simple and its details are clear from the illustrations. The jib head pulleys are mounted on a $1\frac{1}{2}''$ Rod journalled in Trunnions A 5" Rod 28 journalled at the rear end of the jib carries four 1" loose Pulleys spaced from each other by Collars. Two Flat Brackets are placed on the Rod between the Collars and the outer Pulleys.

The cord for raising and lowering the load is fastened to a Cord Anchoring Spring on the Rod of Gear 16 and then passed around the two centre Pulleys on the Rod 28, over the jib head Pulleys and around the Pulley of the Single Sheave Pulley Block. Finally the cord is tied to the Flat Bracket on the Rod 26.

Two equal lengths of cord for raising and lowering the jib are fastened at one of their ends to the Cord Anchoring Springs on the Rod 25, and are then passed around the outer 1" Pulleys on the Rod 28 and around the 1" Pulleys on the Rod 26. Their other ends are fastened to the Flat Bracket mounted on the Rod 28.

This completes the assembly of the model, but before it is set in operation it is advisable to oil the gearing and bearings, and to see that all the Rods run freely.

Parts required to build model electric mobile crane: 4 of No. 2; 2 of No. 2a; 3 of No. 3; 3 of No. 5; 2 of No. 6a; 2 of No. 7a; 6 of No. 8a; 5 of No. 9; 2 of No. 9a; 2 of No. 9b; 2 of No. 9d; 1 of No. 9e; 2 of No. 9f; 4 of No. 10; 2 of No. 11; 8 of No. 12; 2 of No. 12c; 1 of No. 13a; 2 of No. 15; 1 of No. 15a; 1 of No. 15b; 1 of No. 16; 5 of No. 16a; 6 of No. 17; 1 of No. 18a; 3 of No. 18b; 2 of No. 20a; 2 of No. 21; 4 of No. 22; 6 of No. 22a; 1 of No. 25; 2 of No. 26; 1 of No. 26a; 2 of No. 27; 2 of No. 27a; 1 of No. 28; 1 of No. 29; 2 of No. 30; 1 of No. 30a; 1 of No. 30c; 2 of No. 32; 156 of No. 37;af

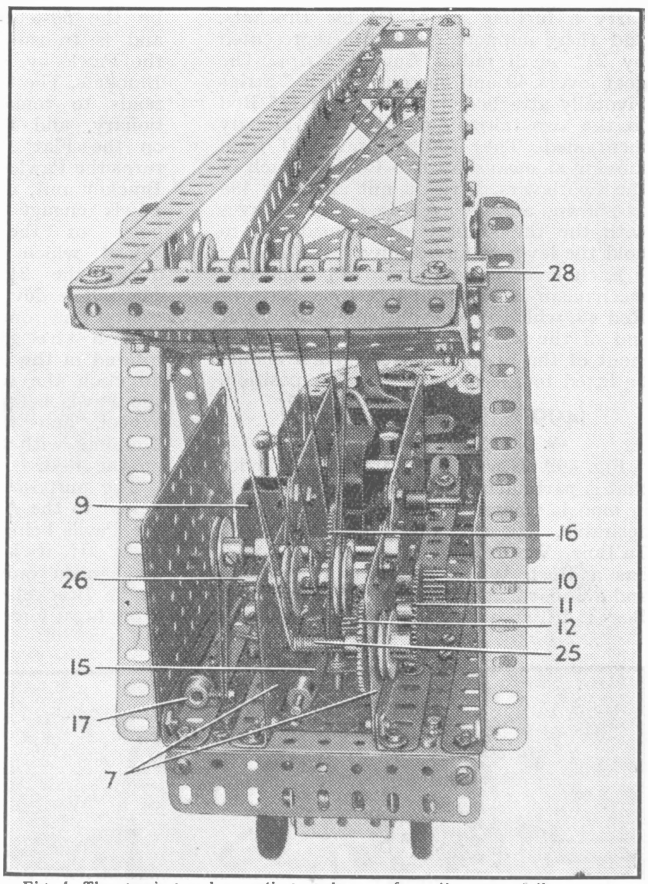


Fig. 4. The gearing and operating cords seen from the rear of the crane.

136 of No. 37bf; 63 of No. 38; 1 of No. 40; 1 of No. 45; 4 of No. 48; 1 of No. 48b; 2 of No. 52a; 2 of No. 53a; 3" of No. 58; 1 of No. 58b; 28 of No. 59; 3 of No. 62; 3 of No. 63; 4 of No. 72; 1 of No. 73; 1 of No. 82; 2 of No. 90a; 1 of No. 103c; 2 of No. 103f; 3 of No. 103h; 2 of No. 111; 4 of No. 111c; 2 of No. 125; 2 of No. 126; 2 of No. 133a; 7 of No. 136; 1 of No. 140; 2 of No. 142a; 2 of No. 142d; 1 of No. 151; 1 of No. 160; 3 of No. 176; 1 of No. 185; 1 of No. 191; 2 of No. 215. 1 E20B or E6 Electric Motor.

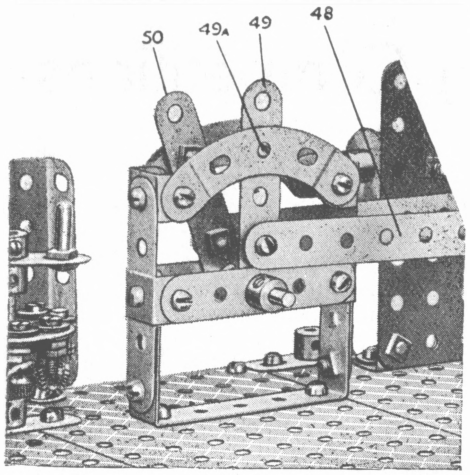


Fig. 498.

(498) Twin Three-Position Levers

Fig. 498 shows a method of constructing and mounting levers intended for such purposes as gear changing, or the application of brakes in model cranes and excavators. A 2½″×1½″ Double Angle Strip is bolted in any required position to the base of the model and each of its vertical lugs supports a 2½″ Strip. The centre holes of these Strips carry Double Brackets connected together by further 2½″ Strips.

The upper ends of the vertical Strips carry a further set of Double Brackets, and these support quadrants represented by 2½″ small radius Curved Strips. The gear levers 49 and 50 consist of 2½″ Strips pivotally attached by means of a 1½″ Rod to the two horizontal 2½″ Strips already mentioned. The Rod is prevented from moving sideways by two Collars. Each of the two levers carries a nut and bolt 49a as shown, and in each case this engages with the three holes of its quadrant, to hold the lever in any desired position.

Each lever is coupled to its respective mechanism in the gear-box by a Strip or Rod 48, which is lock-nutted to the lower end of the 2½″ Strip. If a greater movement of the Strip 48 is required it should be fitted to the lever in a higher position.

(499) Silent Free Wheel

(N. C. Ta'Bois, Woodford Green)

Fig. 499 shows a novel free wheel device that is particularly useful for incorporation in models where quiet running is specially desirable. It was suggested by N. C. Ta'Bois, Woodford Green. A 3½″ Rod 1 has a Bush Wheel attached at one end and a Collar 2 at the other. A Pawl without Boss is fitted with a Flat Bracket and an Angle Bracket, which are bolted to it as shown. A Collar and Washer are bolted to the Angle Bracket by a ⅜″ Bolt. The Bolt 3, which secures the Angle Bracket to the Pawl, is partly screwed into the centre tapped hole of a Coupling 4, and must be free to rotate slightly. A similar unit is attached to the other side of the Coupling. The Coupling is spaced from the Bush Wheel by one Washer.

A Socket Coupling 5 carries a 50-teeth Gear Wheel in one end and a Collar in the other. This Collar is spaced from the Coupling carrying the Pawls by one Washer. A Bolt 6 passes through the elongated hole of the Flat Bracket and carries a Nut that is locked against the Socket Coupling.

With the exception of the Bush Wheel and the Collar 2 the parts on the 3½″ Rod are free to rotate independently of the Rod.

The drive is taken up by the 50-teeth Gear and is transmitted to the Pawls by the Flat Brackets. The Coupling tends to remain stationary, and the pull on the Flat Brackets turns the Pawl and Flat Bracket unit, until the Pawls engage in the holes of the Bush Wheel, which in turn drives the 3½″ Rod. The whole device then rotates as one unit. When the gear is rotated in the opposite direction the reverse action takes place, the Pawls being retracted from the Bush Wheel, and the Socket Coupling and Coupling with their trappings rotate idly on the Rod.

The purpose of the Collar and Washer bolted to the Angle Bracket is to prevent the Pawls being disengaged by centrifugal force. If it is intended to rotate the mechanism only slowly the Collars and Angle Brackets may be discarded, as the centrifugal force exerted on the Pawls will not be sufficient to raise them from the holes of the Bush Wheel until a fairly high speed is attained.

One great advantage of this free wheel over the usual Pawl and Ratchet type device is that it transmits the drive smoothly when in operation. Other useful features are its compactness and shape, which allow it to be incorporated in small models.

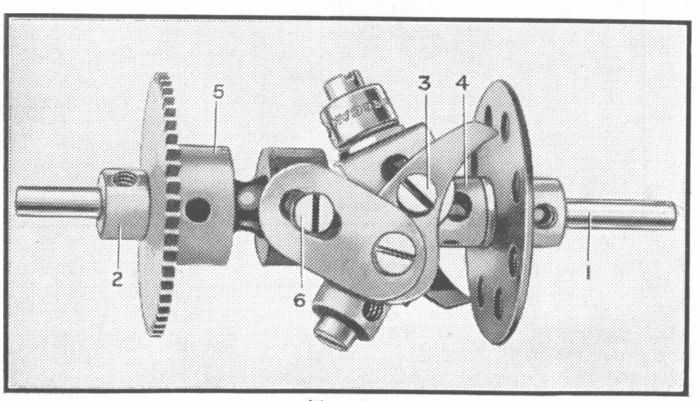


Fig. 499.

Suggestions Section

By "Spanner"

(500) An Indoor Clothes Line

(J. Mathews, Aylesbeare Common)

A useful clothes line device that is suitable for use when light clothes are to be dried or aired indoors is suggested by J. Matthews, Aylesbeare Common. It is shown in Fig. 500.

The frame of the model consists of four 3½″ Angle Girders arranged as shown. To each of the centre holes of two opposite Girders are bolted a 3½″ Strip 1 and a 4½″×½″ Double Angle Strip 2. Two more 4½″×½″ Double Angle Strips are bolted to the same Girders, and the other ends

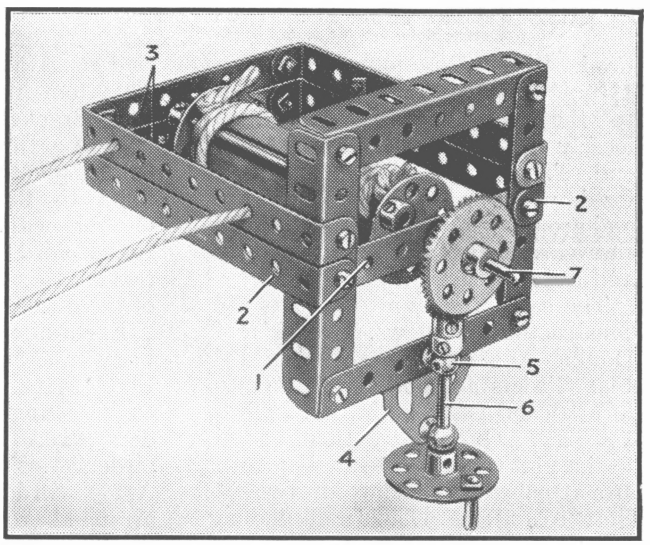


Fig. 500.

of the two pairs of Double Angle Strips are joined by two 3½″ Strips 3. A Trunnion 4 fitted with a Handrail Support is bolted to the lower 3½″ Angle Girders. The Handrail Supports provide bearings for a 2½″ Axle Rod 6 fitted with a Bush Wheel that carries a Threaded Pin and a ½″ Bevel Gear. The Bevel Gear meshes with a 1½″ Bevel Gear on a 6½″ Rod 7, which carries also a Wood Roller held between two Bush Wheels secured to the Rod.

The ends of the clothes line are gripped under a 5″ Rod held by Collars in the groove of the Wood Roller. Outside the Bush Wheel on the rear end of the 6½″ Rod 7 is a Ratchet Wheel, and a Pawl attached to the frame by a Pivot Bolt prevents the cord from running out when the winding handle is released. The cord is attached to the drum so that one end of the cord unwinds as the other end winds up.

The indoor clothes-line should be firmly secured by the two 3½″ Strips 3 to a wall, in such a position that the winding handle is easily accessible.

If desired, the winding handle may be lengthened by using a longer Rod in place of the Rod 6, but it will be necessary to produce an additional support for this, as near as possible to the handle end. This may be a Handrail Support bolted to an Angle Girder attached to the frame.

Prize-winners in recent Meccano competitions. Top, A. N. Carter, Melbourne, Australia. Bottom, S. Hall, Bingley.

Meccano Model-Building Competitions

By "Spanner"

Prize-winners in the "Suggestions" Contest

The prize-winning entries in the "Suggestions" Competition, which was announced in the October 1940 issue of the *"M.M."*, are most interesting, and the best among them will be illustrated and described in detail in *"Suggestions Section"* in due course.

The names of the prize-winners are as follows:—

First Prize, Cheque for £3/3/–: H. Everett, Linden Wood; Second, Cheque for £2/2/–: A. Brown, Oldbury; Third, Cheque for £1/1/–: N. Ta'Bois, Woodford Green.

Prizes value 10/6: C. West, London S.E.18; K. Poole, Walsall; A. Simms, Bangor, N. Ireland, J. Palmer, West Town, Nr. Bristol; G. Dean, Newcastle-upon-Tyne 3.

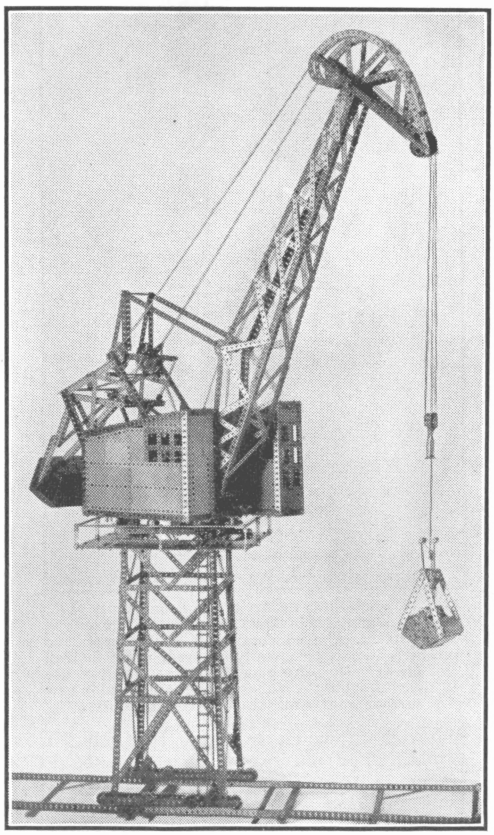
Prizes value 5/–: E. Brick, Cardiff; E. Barras, Richmond; R. Slape, Portsmouth; J. Cole, Rottingdean; B. Clear, Armagh.

The First Prize was won by H. S. Everett, Linden Wood, who contributed an electrically-operated control for creeper tractors. This device is intended chiefly for tractors and tanks that are driven by an electric motor, and much enjoyment may be obtained by installing it in model tanks and arranging miniature battles. The mechanism consists of two solenoids that are energised alternately by rotating the steering wheel of the tank clockwise and anti-clockwise. Levers are connected to the cores of the solenoids and these cause ½" Pinions to engage or disengage 1½" Contrates fixed on the half axles that carry the creeper sprockets.

A. F. Brown, Oldbury, was awarded the Second Prize for a neat and compact retractable undercarriage suitable for use with either the landing wheels or the tailwheel of an aeroplane. This device is strongly constructed and permits of easy operation from the pilot's cabin. The wheel is mounted on an axle secured on two Rods pivotally attached to the framework by Small Fork Pieces. Movement of these Rods is controlled by two Curved Strips pivoted at one end to a Coupling, which is moved longitudinally by a Screwed Rod rotated by a ½" Pinion.

N. C. Ta'Bois, Woodford Green, was awarded Third Prize for a solenoid-operated control mechanism for model cranes. A novel feature of this mechanism is a simple device that ensures the "pull" of the solenoid remaining constant, instead of decreasing, as it normally does, when the core is pushed into the Coil. When the current is switched on the core rotates a Rod 1/10th of a revolution, operating through a crank, a Pawl and a Ratchet Wheel. This Rod carries a five-sided cam, which in turn causes a ¾" Pinion to move into or out of mesh with a 50-teeth Gear on the Rod of the winding drum.

G. A. Dean, Gosforth, submitted interesting suggestions for independently sprung front and rear suspension units suitable for incorporation in a model motor chassis. They are based on what is known as the wish-bone bracket system, in which a difference in length in a pair of brackets from which the wheels are suspended maintains the wheel track constant at the point of contact with the road, under all conditions of load and steering. Five Swivel Bearings joined together represent the track rod and these ensure correct wheel movement and provide flexibility.



A remote-controlled level-luffing crane that won a prize for N. C. Ta'Bois, Woodford Green, in a Meccano competition.

In the case of the rear axle unit, the differential drives two 1½" Sprockets that revolve independently of each other on pivot bolts secured in a Coupling mounted in the centre of the axle unit. The drive is then transferred from the Sprockets to the wheels by built-up universal couplings made from Angle Brackets.

Among the many other interesting suggestions submitted were revolution-counters, clutches and gear-boxes for cranes, and I shall include some of these in *"Suggestions Section"* from time to time.

Meccano "Originality" Contest

In this competition prizes will be awarded for Meccano models of an original nature. Models of any type and size may be entered and the judges will make their awards mainly for novelty in choice of subject and in the use of Meccano parts. Although new and unusual subjects should be looked for those of the more ordinary type such as ships, locomotives and motor cars, are not excluded, but readers who build models of this kind should endeavour to introduce some new method of construction or other novel feature. Every model submitted must be the competitor's own work.

The Contest will be divided into two sections. A, for competitors living in the British Isles, and B, for competitors living Overseas. There are no age limits, the contest being open to all Meccano enthusiasts, but the ages of competitors will be taken into consideration when their entries are being judged.

The prizes to be awarded in each section are as follows. First, Cheque for £2/2/–; Second, Cheque for £1/1/–. Third, Postal Order for 10/6. There also will be a number of consolation prizes.

Readers should send in photographs or good drawings of their models, together with any explanations that may be necessary, although the latter should be made as brief as possible. Each competitor must write his full name and address on each sheet of his entry and on the back of each photograph or drawing, and his age also must be stated. Envelopes containing entries should be addressed *"Originality Competition, Meccano Ltd., Binns Road, Liverpool 13."*

The closing date for Section A will be 30th April, and for the Overseas Section 31st August.

"Simplicity" Contest Still Open

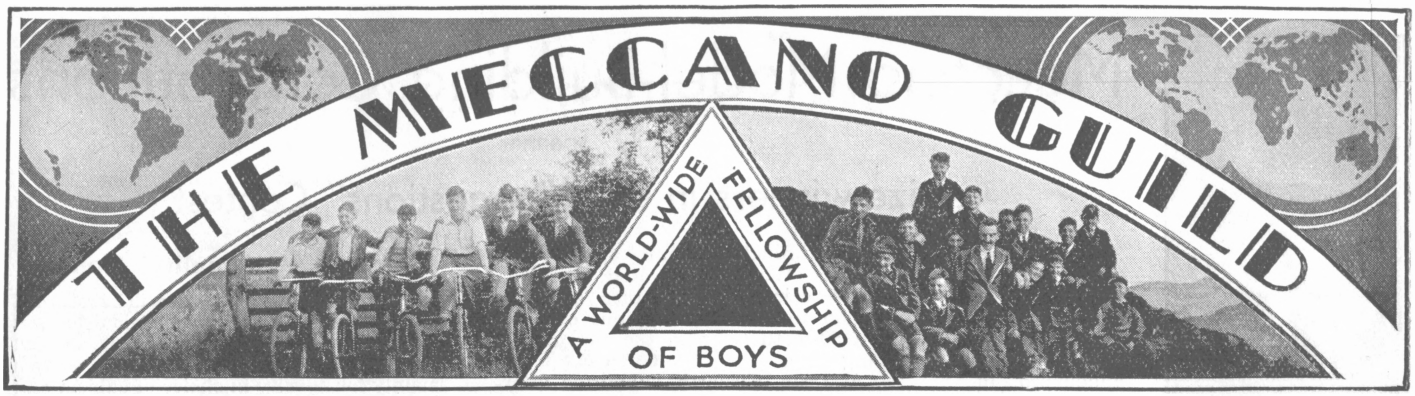
The "Simplicity" Contest announced last month is still open for entries, and the essential details are repeated here for the benefit of readers who did not see the original announcement and would like to send in an entry. In this Contest prizes will be awarded to model-builders who succeed in constructing the most ingenious models with the smallest possible number of parts consistent with a realistic effect.

When the model is completed the competitor should obtain either a photograph or a good drawing of it and then send this to "Simplicity" Model-building Contest, Meccano Ltd., Binns Road, Liverpool 13.

Entries will be divided into two Sections as follows: Section A, for readers of all ages living in the British Isles, and Section B for Overseas readers of all ages.

The prizes to be awarded in each Section are as follows: First, Cheque for £2/2/–; Second, Cheque for £1/1/–; Third, Cheque for 10/6. There will also be several consolation awards.

Section A will close for entries on 31st March, but Section B will remain open until 31st July.



Progress in Wartime

In spite of the war, and the trials and adventures that it has brought with it, the Guild not only continues to hold its own, but is making remarkable progress. This is shown particularly by the number of enrolments in recent months, all of which have been considerably above those for the previous year, and also for those of several years prior to the outbreak of hostilities. For instance, the number of new members who joined in January of this year is several hundred more than that of the last pre-war year, 1939, which in itself showed a great advance on the years immediately before it.

The Club movement shows equally remarkable progress. There are many Clubs that have been compelled by blackout conditions and air raid warnings to shorten meetings, to reduce their number, or to change Club rooms, and there have been instances of actual loss by enemy action. Yet all are continuing undaunted, and members show greater keenness than ever when the opportunity for action is given them. In addition there is a formidable list of Clubs in process of formation, and peaceful conditions will bring a vast extension of activities. Thus the Guild and Club movement is proving itself in war conditions, and the coming of victory will give greater opportunities than ever for Meccano boys, the engineers of to-morrow.

Our Visitor Friends

One Club that has seized a splendid opportunity that the war has brought is the Exeter M.C. Many boys from London are now in Exeter, where they have found refuge and a cordial welcome, and these have been invited to take part in the work of the Club, not merely as visitors, but as actual members, joining in every activity and even occupying official positions. Recently the London members organised a special meeting, at which old Exeter members were entertained by them as if they were visitors.

A pleasant feature of this association is that the London boys are never spoken of as "evacuees." Instead they are "our visitor friends," and are treated as if they have always lived in Exeter and have been members of the Club for years. As a result the London boys are really at home. In this way the Exeter M.C. is helping to spread the Guild spirit in new quarters, and similar friendly action in other districts is sure to have far-reaching effects when the war comes to an end.

Model-Building with a Purpose

In many Clubs March brings with it a period of preparation for Exhibitions, Displays or Open Nights to mark the end of the Winter Sessions. These events are admirable in that they give friends of the Club an opportunity of seeing how members have been occupied during the dark days, and the displays that are made provide

Mrs. K. Franklin is Leader of the Brondesbury M.C., which was affiliated in May 1940, with Mr. K. Franklin as President. A good club room was secured, and meetings in it were greatly enjoyed, while football and cricket also were played. Evacuation gave rise to difficulties, but the club is being reorganised in new surroundings to meet existing circumstances.

material on which to judge the value of Club life. For this reason every effort should be made to produce a really good impression.

In particular the material displayed must be of first class quality. Every Club shows models, and these invariably include splendid efforts, often of a novel type designed by members themselves. An even better impression is produced if the models themselves, large or small, fit into a scheme of some kind, and I urge all Leaders who are making preparations for such an event to think over this point very carefully. It is not difficult to decide upon a suitable scene into which a variety of models can be introduced, and in this place should be found for small models constructed by younger members as well as for the larger and more impressive efforts of experienced model-builders.

One advantage of this method is that a topical scene can be built up by providing models with a suitable background. Two good examples come from the Maylands (Western Australia) M.C., and are referred to in *"Club Notes"* on the opposite page. One of these assemblies presented a contraband station, and gave splendid opportunities for the construction of waterline ship models of all sizes. The other represented an airport, with a balloon barrage as protection against dive bombing. Aeroplanes are favourite subjects for model-building at the present time, and the selection of such a subject as this provides members with the opportunity they want for building miniatures of their favourite machines, both large and small. Other good suggestions are a seaport, which has the special advantage that a miniature railway can be introduced into the scene, and an engineering workshop fitted up with miniature machines.

The preparation of a scenic display of this kind involves a little more work than the mere arrangement of models on a bench, but the extra time and energy thus spent is amply repaid by the increased interest of members as well as visitors. Well-built models create a good impression, but this is intensified many times if they are also well displayed.

Proposed Clubs

CHRISTCHURCH—N. Shave, Tanglewood, Albion Road, Christchurch, Hants.
CROYDON—Mr. A. Bula, 61, Shirley Road, Addiscombe, Croydon.
CUDWORTH—T. Exley, 62, Pontefract Road, Cudworth, Nr. Barnsley.
MAIDSTONE—R. Sutcliffe, 66, College Road, Maidstone, Kent.
OXFORD—J. Smith, 55, Church Hill Road, Rose Hill, Oxford.
TORDMORDEN—R. Cunliffe, 7, Major Street, Halifax Road, Todmorden, Lancs.

Proposed Branches

CHESTER—J. A. Blake, 10, Grange Road West, Vicar's Cross, Chester.
CRADLEY HEATH—C. A. Brindle, 183, High Street, Cradley Heath.
HAYES—C. Bodimead, 7, Fourth Avenue, Hayes, Middlesex.
HULL—G. Blakeley, 25, Aisne Street, Chanterlands Avenue, Hull.
KEYNSHAM—J. Partington, "Budlea," Bath Hill East, Keynsham, Nr. Bristol.
LONDON—H. W. Skerratt, 10, Alroy Road, Finsbury Park, London N.4.
NEW BARNET—A. Sweetman, Waveney, Brookhill Road, New Barnet, Herts.
NEW MILTON—M. Bird, Resthaven, New Milton, Hants.
SHEFFIELD—R. Polling, 6, Winsford Road, Birley Carr, Sheffield 6.
STOCKPORT—W. Taylor, 85, Spring Bank, New Mills, Stockport.

Club and Branch News

Branch News

Batley and District.—The time of meeting has been altered from Friday night to Saturday afternoon. The Branch Hornby-Dublo layout is built on a plywood base, and a station and a turntable have been constructed for use on it. Track operations have been carried out regularly, and the use of Hornby-Dublo Electrically-operated Points has increased the fun and given rise to considerable satisfaction. *Secretary:* J. K. Hodgkinson, 191, Soothill Lane, Batley, Yorks.

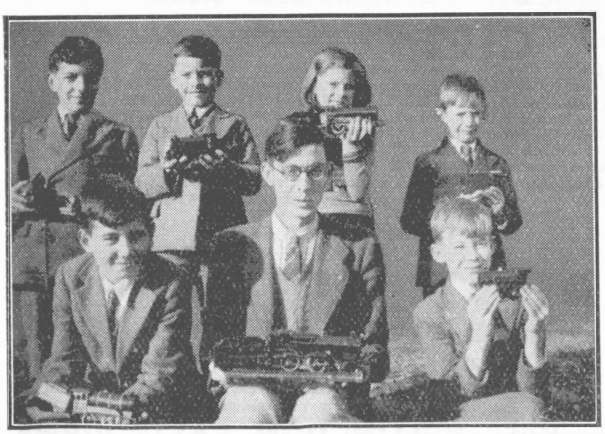
Southwell (Northampton).—Members of this Branch have been successful in carrying out full programmes. The line represents the track of the "*Irish Mail*," with branches. Four sets of working plans have been arranged, and these are put into operation regularly. The Holyhead-Belfast service and the necessary local connections have been doubled, a new mail boat "*The Anglia*" having been constructed for the purpose. The harbour at "Holyhead" is now too small for the traffic, and is to be enlarged. Other work to be carried out includes the extension of platforms at "Stafford," the enlargement of the station at "Chester" and a thorough overhaul of track. *Chairman:* Mr. J. Southwell, 127, The Drive, Northampton.

Hornsea.—Interesting work has been carried out with a new layout, the main feature of which was the running of "*The Flying Scotsman*" in miniature. Experience has indicated various improvements, such as the addition of an engine yard at one of the stations, and these have been carried out. At one meeting special attention was paid to goods traffic, shunting practice being given to the younger members, known as "Apprentices," who soon became really skilful. *Secretary:* D. E. Parker, 8, Burton Road, Hornsea.

Loughton.—Meetings have been devoted regularly to the running of trains on the Branch layout. There have been several interesting accidents, but these are now fewer, partly because the track has been improved and partly because of the increasing skill of members. Signals and Points have been repaired and renewed where necessary, and the track is being extended. The next step is to introduce timetable working. *Secretary:* G. W. Ruffell, 10, Elmhurst Way, Loughton, Essex.

Dumpton House School.—The Branch Exhibition was attended by 33 visitors, who greatly enjoyed themselves. A member of the Branch began the proceedings by making a speech on the working of Hornby Electric Locomotives, after which operations were carried out on the special layout built for the purpose. A series of Branch photographs have been taken. More rolling stock, both Gauge "0" and Hornby-Dublo, is now available. The track is being extended in order to accommodate these, and preparations are being made for a larger Exhibition than that already held. *Secretary:* J. P. Oboussier, Crichel House, Nr. Wimborne, Dorset.

Carmarthen.—Track operations have included the running of milk "Specials," express goods trains and Army "Specials." In addition a wartime "*Cheltenham Flyer*" has been run in war conditions, with stations blacked out. Members have practised the use of the switchboard and of various types of track formation incorporated in the layout, and new members have been given training in running operations. Chemical experiments have been continued, small prizes being awarded to the members who obtained the best results. The usual games have been played and the Branch's first birthday was celebrated by a Film Show, for which Mr. R. Lewis, Chairman, kindly provided refreshments that were greatly appreciated. *Secretary:* J. D. Lewis, 7, Spilman Street, Carmarthen.



Members of the Martinwhite (Guildford) Branch, No. 402, of the H.R.C. Mr. P. Martin, Chairman, is seated in the centre, with T. M. White, secretary, on his right. The Branch was incorporated in October 1940, and now possesses a good layout and a stud of 14 locomotives. Good constructional work is carried out, and interesting operations are planned and put into practice on Track Nights.

Selly Oak Model Railway Club.—Members were entertained to tea by Mr. and Mrs. Hughes, Harborne, after which various games were played. The Branch layout is now being extended. It will shortly include a terminal station and a shed for seven locomotives. Experiments are being carried out in Morse code signalling between the control boards for the various sections of the track. *Secretary:* G. C. Jones, 12, Blackthorn Road, Bournville, Birmingham 30.

Islington.—The Branch has not yet secured an official room to replace the one damaged by enemy action, but work continues, refreshments being kindly provided at each meeting. The Branch's steel track was preserved intact, together with station buildings, and now that the evenings are lighter good progress is being made with replacements, which will be speeded up when a good Branch room is obtained. Stamp Collecting and Fretwork are other activities that are being carried on regularly. *Leader:* Mr. V. Miller, 541, Liverpool Road, London N.7

Hornsea Evacuee M.C.—Interesting Lantern Lectures have been given, together with talks by the Leader. Special meetings have been devoted to Hornby Train operations, and these have been very instructive and enjoyable. Club roll: 15. *Leader:* Mr. R. W. Shooter, The Gowans, Cliff Road, Hornsea, E. Yorks.

The Exeter M.C.'s Fourth Football Team, the members of which are chosen from the youngest boys in the club, with Mr. M. C. Hodder, Leader. Football has made good progress at Exeter during the past winter. Records also have been made in model-building and attendances at meetings, and an outstanding recent club event has been a presentation to Mr. Hodder to mark his completion of 21 years of Leadership.

Club Notes

Tynecastle School (Edinburgh) M.C.—Members have been busy constructing models of all kinds, including aeroplane models. These were displayed at a Guest Night, to which friends and parents were invited, and aroused great interest. A special visit was made to an exhibition of model planes. Club roll: 20. *Secretary:* I. Anderson, 28, Moat Street, Edinburgh 11.

Acton M.C.—Steady work continues on the new Hornby Railway that is being constructed. More sleepers have been laid down, and an interesting discussion was held on the design of the goods yard at "Weatherbridge." A Meccano model of an ash handling plant has been commenced, and this is to be installed on the layout. The monthly Film Shows given by the secretary continue to be well supported, and an attractive Lecture, illustrated by maps and diagrams, has been given on "*The Weston, Clevedon and Portishead Railway.*" Club roll 14. Secretary: S. W. Simmons, 37, Derwentwater Road, Acton, London W.3.

Exeter M.C.—A review of progress during 1940 shows that there was a record attendance, and 331 excellent Meccano models were built by members. A handsome clock was presented to Mr. M. C. Hodder, Leader, to mark the completion of 21 years of office. The presentation was made on behalf of the members by Mr. H. W. Causley, President. The Club honours list was longer than ever, and the number of speeches made by members at the annual Christmas meeting also was a record. An interesting innovation is the formation of a Club for boys from London who have been evacuated to Exeter. This is run in association with the existing Exeter Club, and has proved very successful. A special Christmas meeting was held for these members, who organised a programme and entertained the Exeter members as if they were visitors. Club roll: 100. *Secretary:* A. E. Davie, 4, Roseland Crescent, Heavitree, Exeter.

Coloured Mission (Cardiff) M.C.—While the weather was good excursions were made regularly on Saturday afternoons, groups of members being taken by Mr. D. H. Binstead, secretary, in his car to country places, where games were enjoyed. Plans for resuming indoors are now being made. Club roll: 20. *Secretary:* D. H. Binstead, 37, Penhill Road Cardiff.

Plymouth M.C.—Meetings are being held at the home of Mr. W. J. Ellis, formerly Leader, who is now in the Army, the intended meeting place having been damaged by an incendiary bomb. The programme consists of operations on Mr. Ellis's model railway, which is being repaired and kept in good order, making fretwork models and building model aeroplanes and ships, in addition to Meccano model-building. This work is being done under the guidance of Mr. C. J. Burley, the new Leader. Club roll: 120. *Secretary:* A. E. Miller, 21, Hamilton Gardens, Mutley, Plymouth.

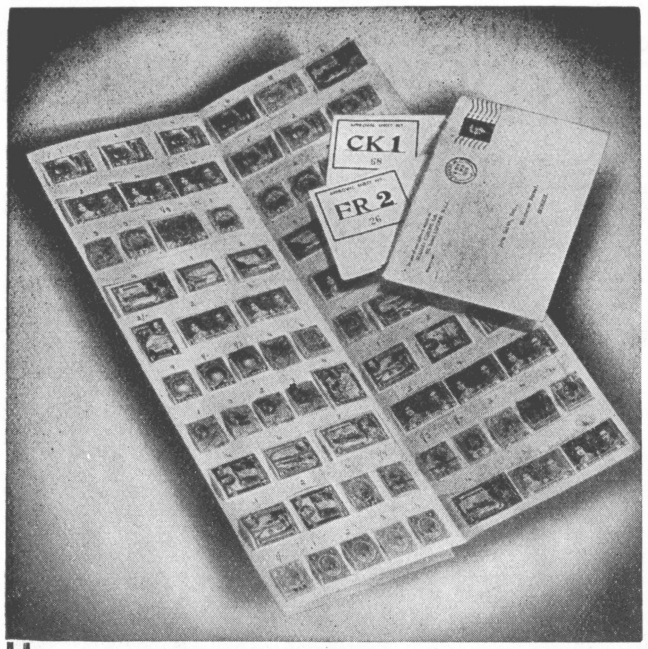
Hornsea M.C.—Excellent work continues to be done by the officials and members of the Club. Mr. A. Tawn's Lectures on scientific topics have included one on "*Sulphuric Acid*," and Mr. R. W. Shooter, Leader, has completed a series of talks on "*Electricity*." Range-finders, mines, the Navy and aeroplanes have been the subjects for other interesting talks. The working of cameras and projectors for cinematograph work have been explained, and members have enjoyed games as well as operations on the Club's Hornby Electric Railway. Club roll: 21. *Secretary:* P. Richardson, 14, Grosvenor Terrace, Hornsea.

AUSTRALIA

Maylands (Perth) M.C.—There has been intense activity in model-building, excellent large models such as an ambulance, flying boats, harbour cranes and others being rapidly completed. Outdoor meetings have included assembly on the beach for swimming, and rambling and hiking in the heart of the Darling Ranges, about 17 miles from Perth. The Reserve Club has taken part in these outdoor events. The chief aim now is to rebuild the Club room, and special efforts are being made in order to raise the necessary sum. A Shooting Gallery has been laid out, and members of the Club and Reserves are becoming skilful marksmen. At the Factions Exhibition the Green-Gold Faction won the prize with an assembly of models to represent a Contraband Station, complete with cargo vessels, destroyers and patrol boats, and light cruisers bringing in suspicious neutral ships. The Red-Blue Faction presented an Air Port, with a balloon barrage, and this too was a splendid effort. Club roll: 34. *Secretary:* W. Petersen, 1, Warne Street, Maylands, Perth, Western Australia.

MALTA

Lasallian M.C.—Activities have been resumed and several new members have joined. Model-building is pursued with greater enthusiasm than ever. Models of war interest were called for in a special contest, and the majority of entries represented ships of the Royal Navy. Rev. Bro. Walter Joseph, F.S.C., formerly Rector of the College and a great friend of the Club, has given a very interesting Lecture and presented two pairs of cage birds, and Mr. J. Booker has lent a projector and films for a Cinema Display. Football and Table Tennis continue and Air Rifle Shooting has been taken up. Club roll: 36. *Secretary:* A. Caruana, St. George's Street, Gzira, Malta.



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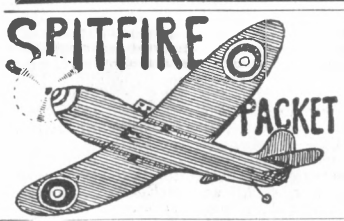
FRED HARLOW, B.P.A., 133, BRADBOURNE VALE, SEVENOAKS, Kent



PACKET contains 36 air, triangular, and stamps with aeroplanes on, etc.—2 LIBERIA triangular (with aeroplane), usually sold at 7d.; NIGERIA (Geo. VI); COSTA-RICA triangular (fish); URUGUAY INDIA (mail train); ROUMANIA (Carol); 8 CANADA (a fine set including large Royal Visit pictorial); 2 TANGANYIKA; 3 PALESTINE (pictorials); 6 BRAZIL (including airpost and aeroplane design); 5 U.S.A. (obsolete); 2 JAVA; COSTA-RICA (Exhibition triangle) and MOROCCO, LARGE PICTORIAL; Peru New Issue; GERMANY (airpost); COCHIN (large) and IRAQ.—Price 5½d., postage 2½d. extra, abroad 3½d. extra. Money back if you are not satisfied. Applicants for approvals receive 8 Peru FREE (catalogued at 9d.) and in addition, those sending addresses of stamp collecting friends get an additional set of 4 GEORGIA. FOR EVERY PACKET SOLD I AM GIVING THE PROFIT TO THE "SPITFIRE FUND," SO YOU WILL BE HELPING TO WIN THE WAR.

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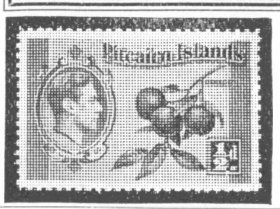

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For other Stamp Advertisements see page xi

STAMP COLLECTING

War Stamps are Worth Collecting

NOTHING illustrates more vividly the simple truth that great events are best portrayed in the pages of a stamp album than the fact that 3,000 special stamp issues appeared during the Great War of 1914-18. The war stamps of the present struggle are already appearing, and in days to come they will provide an absorbing picture of this second World War.

War stamps may be divided into four main classes — occupation stamps, charity issues, war tax stamps and miscellaneous provisionals. Occupation stamps are issued provisionally by military commanders on taking over enemy territory. Charity issues, such as Red Cross or Distress Relief stamps, are sold at a premium on face value to raise funds for war charities in the belligerent countries and elsewhere. War Tax issues usually consist of regular issues overprinted to denote increased postal charges as part of national war taxation, and miscellaneous provisional issues are produced to meet special needs arising out of war conditions.

Such stamps appeared in every one of the belligerent countries during the last war, and almost certainly they will recur many times in all of them in this war. And again, as in the last war, collectors in the countries concerned will find it almost impossible to obtain specimens of the other side's issues until the war is over. A few used specimens of issues from German-occupied territory may find their way to Britain via neutral countries, but it certainly will not be possible to buy unused specimens. War stamps, therefore, are worth collecting immediately they appear. They are rarely used in large quantities, and as soon as the war is over there will be a rush from collectors seeking specimens hitherto unobtainable. Prices therefore will rise, in some cases to high levels, and those who care to sell may make substantial profits.

A 1918 war charity issue from the Bahamas.

So far only one series of "occupation stamps" has been issued on the Allied side. This is Greece's issue for the conquered area of Albania. At the time of writing, none of these stamps has reached Britain, although we know of one small consignment that is on its way, and we hope to illustrate them in an early issue.

Germany has issued special stamps for use in Poland, and has compelled a change of design in Holland; but there is no news of any alterations in the stamps of the remaining occupied countries other than France. In France a new issue is projected,

Three occupation stamps of 1914-18. The first was issued by Germany for use in Belgium, and the other two are German Colonials overprinted by the Allies for use in the Cameroons and Marshall Islands.

but for the present France and the other countries continue to use the issues on sale at the time of the German occupation.

The Baltic States taken under the "protection" of Russia also continue to use their old stamps, but we learn from *"Gibbons Stamp Monthly"* that Lithuania has already issued various current stamps with an overprint "L.T.S.R.—1940 VII 21," to mark its new status as a republic within the Soviet Union.

There have been two Allied charity issues, the first appearing in France in February last in aid of soldiers' comforts funds. The other is the Australian Imperial Force commemorative issued with a premium for Red Cross Funds. Both of these have already been illustrated in the *"M.M."*

On the Allies side there have been several provisional issues, and one at least with an overprint to vary the rate in consequence of revised postal charges. This was the New Zealand Health issue of October 1939, which appeared with the originally intended values of ½d. and 1d. blotted out and replaced by new values 1d. and 2d. This stamp can hardly be called a provisional, however. It is an odd case of a charity issue appearing with a hastily altered design to meet new conditions arising out of [illegible]

The Newfoundland November [illegible] provisional, the overprinted Royal Visit issue, was the first war stamp of the present conflict. It was produced to meet a shortage of supplies in consequence of delay in the arrival of new shipments. Another interesting provisional comes from

British stamps overprinted for use in the German Colonies of Nauru and German East Africa during the Great War.

the Faroe Islands, now in the occupation of British Forces as a preventive measure. Normally the Faroes use the stamps of Denmark, but of course, new supplies of such stamps are not likely to be available while Germany occupies Denmark. Supplies of the 20 ore value having become exhausted following an increase in the postal rate from 15 ore to 20 ore in July last, the 15 ore value has been surcharged to meet the shortage. A specimen of the surcharged stamp was reproduced in the January 1941 *"M.M."* accompanied by an unusual advertising postmark.

It is highly unlikely that this war will produce so great a flood of special issues as did the last war. Then a great part of the 1914-18 issues were needed for use in the conquered German colonies, and separate issues were adopted for each Colony as it was "mopped up." Usually the stamps of the Colony itself were overprinted with suitable wording to denote the new situation. Thus it is probable that readers who set out to make a collection of issues of the present war will not find their purchases making too heavy an inroad into their pocket money.

There are certain forms of war stamps that all can obtain without cost, however. As our readers know, most British units on active service, and Naval units afloat, have the privilege of free postage, a frank applied in the unit headquarters serving to carry the letter home. Many of these franks are simple censor marks, often accompanied by a Naval or Army Post Office marking. The inclusion of these in a war stamp collection is quite permissible, although they are not adhesives.

Examples of War Tax stamp issues. The British Honduras issue was given a moire background, introduced so that the stamps could be identified and demonetized should they fall into enemy hands.

Stamp Gossip

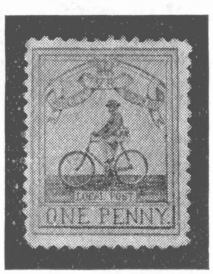
and Notes on New Issues

The Lord Baden-Powell Portrait Stamp

With the death of Lord Baden-Powell we have lost the central figure of the story of one of the most remarkable stamp issues that the British Empire can boast. During the Boer War, the town of Mafeking was besieged by the Boers from October 1899 until May 1900. The inhabitants of the town naturally desired to communicate with their friends outside, but during the first weeks of the siege the town was so closely beset that no letters could be smuggled through the enemy lines. Later, when Lord Roberts had relieved Kimberley and was pressing forward to Pretoria, the Boers were compelled to withdraw some of their troops and as a result native runners carrying letters were able to make their way through gaps in their lines.

Mails were sent out regularly, bearing first stamps of Cape Colony, British Bechuanaland and the Bechuanaland Protectorate, over-printed with the words *"Mafeking"* and *"Besieged,"* and surcharged to meet the high postal charges involved in paying the runners in accordance with the risks they ran.

The demand for a 3d. value was so great that it was thought desirable to have a special stamp designed for production in the town. Captain Greener, who was Chief Paymaster during the siege, was responsible for the design, and his proposal that this should consist of a portrait of Colonel Baden-Powell, as he then was, commander of the British Forces in the town, met with considerable opposition from the Colonel, who felt that such a design would be considered improper. Ultimately the Colonel gave way under further pressure from his staff, and the stamp shown here was produced. Baden-Powell's fears were more than justified, for when the stamps reached England a storm of criticism was aroused and the Queen herself expressed considerable displeasure. It was typical of the great leader that he allowed the blame to rest with himself, and not for many years after did the truth of the incident come to light.



The stamp is illustrated on this page, and we reproduce also another of the special stamps produced in Mafeking, the 1d. local post that did duty for correspondence posted by the defenders to their relatives and friends in the area outlying the forts. These relatives were not permitted to visit the forts, neither were the defenders allowed outside to visit. All communication had to be by letter, and every evening at 5 o'clock messengers on bicycles set out from the forts to the outlying points. The messengers were boys from a Cadet Corps organised to act as orderlies during the siege, and in token of appreciation of their good work, one of their number, Sergt.-Major Goodyear, was selected to have his portrait on the special stamp.

Bermuda War Provisional

The Bermuda provisional illustrated on this page is the latest addition to the list of British war stamps. It appears in consequence of a wartime change in postal rates and delay in the arrival of new supplies. The stamp is the current 1d. issue, and the surcharge has been applied locally with typeset lettering. Varieties abound in the settings. There are two quite distinct differences in the spacing between the words *"Half Penny"* and the cancelling crosses, and broken letters abound. We mention these features so that readers may be on their guard against paying fancy prices for varieties. They are as common as the perfect specimen.

A Turkish issue overprinted after the capture of Mesopotamia

Incidentally, the issue is an interesting example of how war stamps shoot up in price. Prices as high as 3/– are being paid by those who are anxious lest they should fail to obtain a copy. Other dealers are charging various prices and the lowest we know is 9d., which at the present time is not unfair, since supplies are small and likely to be exhausted quickly.

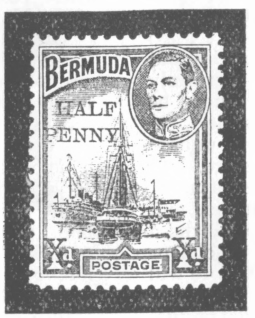
South American Centenaries

A set of five stamps is to be issued shortly in Chile to commemorate the fourth centenary of the founding of Santiago, the capital city. Four of the designs will show portraits of the original "City Fathers," while the fifth will bear a symbolical design depicting the development of the city over four centuries.

Another forthcoming South American commemorative is a Brazilian issue to celebrate two great events in the story of Portuguese independence. These are the 800th anniversary of Alfonso's wresting of the country's sovereignty from Spain in 1140, and the 300th anniversary of the setting up of a provisional government by Archbishop Da Cunha, who later succeeded in placing King John IV on the throne. The dates 1140, 1640 and 1940 are shown in the design of the stamps, which consists principally of the reproduction of a painting of the scene at the acclamation of King John.

A Provisional Issue in Occupied France

Just as we go to press, we learn from an American source that early in June, when the Germans entered Northern France and occupied the coast ports, they overprinted a small supply —not more than 2,000 in number—of the 50c. stamps of France with a very crude hand stamp bearing wording that can just be identified as reading *"Occupied Territory of Northern France."* The wording is spread over two stamps, a pair being necessary to show the full wording, and the overprint is applied horizontally in some cases, vertically in others.



Some confirmation of the news of a new issue in occupied France is also available. This is said to be a 50 fr. value commemorating the 1914-18 war air ace Guynemer, whose portrait appears on the stamp. The inscription "R.F." (Republique Francaise) definitely appears. France has never previously issued a commemorative of so high a face value.

Free French Colonial Issue

The French Cameroons have signified their adherence to the Free French movement by overprinting their current series of stamps with the inscription, in three lines, *"Cameroun. Francais. 27.8.40."* The War Charity issue current in the Colony has also been over-printed. The numbers of stamps so issued is very small, we understand; less than 5,000 of certain of the values has been issued.

Stamps Illustrated on a Stamp

It would be interesting to know why Cuba waited until November before issuing its Stamp Centenary Commemorative. Now that it has appeared it proves to be a very interesting specimen, for it is a case of a stamp illustrating a stamp. Actually three stamps are illustrated on it, for the design incorporates reproductions of the British Penny Black, the first Cuban stamp of the Spanish regime, and the first stamp of Republican Cuba.

A second British occupation overprint from Mesopotamia.

Other features of the design are a map of Cuba and a portrait of Rowland Hill, as well as the National Arms and the centenary dates, 1840-1940. The stamp looks much better than one would expect in so crowded a design, and it can be described as a miniature historical treatise in one small page.

* * *

The 11th series of Balkan Olympic Games, held in Turkey last autumn, were celebrated by the issue of four stamps as follows:—3k., runner; 6k., pole-jumper; 8k., hurdler; 10k., discus thrower.

A Famous Diesel-Electric Train

The Chicago and North Western "400"

THE finest train of the Chicago and North Western Railway is the "400", the flyer that runs between Chicago and the twin cities of St. Paul and Minneapolis. As a steam-hauled train the "400" achieved fame by a timed run at an average speed of 75.8 m.p.h. between Chicago and Racine, a distance of 61.9 miles. This was the highest speed maintained in daily timed runs last summer in the United States, and there it was equalled by only one other steam-hauled train.

The "400" became an even more remarkable train in September 1939 when Diesel power replaced steam. A new and ultra-modern streamlined train was then put into service, and this was so popular that during the first month of its working more than half as many passengers again travelled in it as in the corresponding period of the previous year. Two Diesel-electric locomotives were introduced to haul the train. Each consists of two units, each of which in turn is itself a complete 2,000 h.p. Diesel-electric locomotive that could be operated independently if occasion demanded.

The new locomotives are capable of a top speed of 117 m.p.h. In each power for the two motors comes from four 600-volt direct current generators driven by the Diesel engines, and it is applied through 16 driving wheels. It is this large number of driving wheels that gives the locomotives the ability to start long, heavy passenger trains quickly and easily.

The controls of the locomotives are simpler than those of an ordinary motor car, and it actually takes less effort on the part of the driver to start or stop one of the trains hauled by them than is required to start or stop a car. To aid the driver, and in the interests of safety, automatic windshield wipers, automatic defrosters and sun visors are provided, and there is an emergency control pedal, on which the driver must press in order to keep his train in motion. Alternatively he must press down on the control lever, and in each case the train is brought automatically to a stop if the pressure is released.

The springing of fast trains such as the "400" requires very careful attention if the vehicles are to be prevented from swaying. In the new locomotives four hydraulic shock absorbers coupled with carefully-designed springs on each unit are used. The effect of this equipment is not only to control up and down motion of the locomotive but also to lessen motion from side to side.

The streamlined "400", the crack train of the Chicago and North Western Railway, sweeping out of Chicago on its maiden run as a Diesel-electric train. Photograph by courtesy of the Chicago and North Western Railway.

Each unit carries 1,100 gallons of train heating boiler water and 1,200 gallons of fuel oil. With a full supply of fuel, boiler water and sand the total weight of a two-unit locomotive is nearly 270 tons. The length is 140 ft., height 13 ft. 11 in. above rail level and width 9 ft. 10 in.

With the new locomotives is an entirely new streamlined train, consisting of a baggage-tavern coach seating 34 passengers, four coaches each seating 52 people, a 56-seat dining car, two parlour coaches, each accommodating 29 passengers, and a parlour-observation coach seating 26 people.

All the new "400" cars are of steel construction. The flooring is of pressed corrugated aluminium with a layer of cork, and the sub-flooring is of aluminium. The seats in the coaches are rubber-cushioned and can be moved to allow passengers to recline at any angle. Windows are of glare-proof glass. Like the locomotives, the coaches are specially sprung. On the bogies under the dining coaches stabilising levers are employed to keep the vehicles level when rounding curves, so that the dining tables are kept in equilibrium.

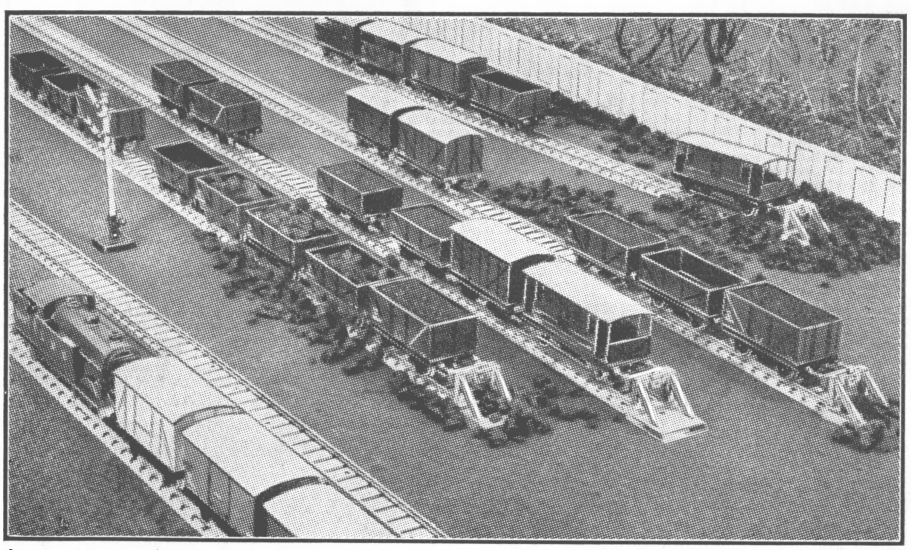
The last coach in the train, the parlour-observation lounge, has a special atttaction in the form of a speedometer built into the end of the car above the windows. *"How fast are we going?"* is a question that travellers on swift trains often ask. Passengers in this coach on the "400" have no need to ask, for they can see what is the exact speed of the train by merely glancing at a dial. They invariably get a thrill when the pointer reaches 80 m.p.h., and begins to climb towards 100 m.p.h., a speed that has been exceeded on several occasions. A second speedometer is installed in what is called the tavern car, which is a refreshment lounge.

Fun With Your Hornby-Dublo Railway

Goods Train Running and Shunting

THIS month we turn to the running of goods trains on Hornby-Dublo railways. Train operation is always of interest, and goods train running is particularly good fun owing to the variety of stock that is available. In addition there are numerous items of special interest that are connected with the freight or goods side of miniature railway work.

In recent articles we have already mentioned the different vehicles of the Hornby-Dublo range and the type of trains for which they can be used. In the ordinary way trains are assembled in the sidings together with the Brake Van to complete the train. They then make various journeys over the layout and in the case of the average continuous system they finally run into the same set of sidings. The wagons are disposed of by shunting them alongside the Goods Station platform and the engine returns to its depot.



A train of vans passing a yard where coal traffic is handled. Hornby Imitation Coal is here used for loading the wagons.

An alternative scheme, and one that reproduces actual working more closely, is for the engine to come from the shed and to run light to the siding, or road in the group of sidings, where the Brake Van is usually kept. In most real shunting yards there is a road reserved for the storage of these vehicles. The engine couples up to the Brake Van and takes it "down the line," picking up various vehicles at each stop until quite a respectable train is made up.

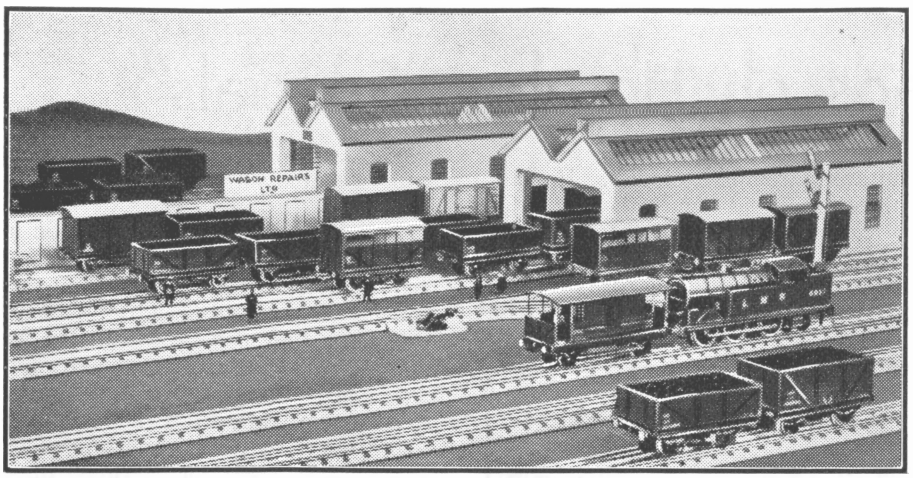
On a big system the wagons or vans will be actually picked up at different points as there will usually be several stations with sidings or yards. On a small continuous line with only a single yard stops will have to be made at the one point on successive circuits of the track. As a matter of fact this will give quite a satisfactory effect if the vehicles picked up have to be sorted out of different roads each time and the train re-marshalled to a certain extent. The continual stopping of the train at the same spot will not then be noticed very much.

The journey made by the complete train can be of any length according to the wishes of the operator. Sometimes one circuit of a continuous layout is considered to represent a definite "mileage" and so many turns round the track are made until the required "distance" is covered, according to the real stations between which each trip is supposed to be run. All kinds of variations can be made in a programme of this sort. Trips of different lengths can be made, the make-up of the train can be changed over and over again so that the fun to be had in this way is almost unlimited.

Generally sidings are arranged parallel to one another alongside the main line, each siding road diverging in turn from a track that branches off from the main one. This is quite a satisfactory arrangement when the chief purpose of the sidings is for the storage of rolling stock and it certainly gives a neat and tidy effect. Where much shunting is to be done however there is the disadvantage that each time a string of wagons is drawn out of one of the sidings roads the engine has necessarily to draw out on to the main line, with the possibility of upsetting the operation of main line trains. To avoid this, if space permits, the arrangement of a shunting neck or spur is an advantage. This invariably takes the form of a dead-end road, arranged on the opposite side of the branch track from which the sidings spring. Then instead of drawing out on to the main line, and thus occupying a section with consequent delay to main line traffic, the engine that is shunting in the sidings draws into the shunting spur.

On an electrically-operated layout this allows the sidings as a complete unit to be electrically separate from the main line, an Isolating Rail being inserted between the Points leading from the main line to the sidings and those serving the shunting spur. The sidings can then have their own Transformer supply and a separate Controller will provide the means of carrying out the operations in the yard. Possibly a Dublo Transformer No. 1 will be employed for the yard, the main line, if double-tracked, being fed from a Dublo Transformer No. 2. With a single main line however the latter Transformer can be used to supply the main line and the sidings or yard, independent control being assured by the use of a separate Controller for each circuit.

On a layout arranged as a number of units each on a section of baseboard this scheme makes it possible to bring into use just the siding or yard unit alone. Sometimes it may not be worth while assembling the whole railway for operations over a limited period of time. In that case the yard unit can be brought from storage, set up on its supports, or even placed on a table, and a series of interesting shunts can be carried out. This is good practice in yard operation and is a change from the working through of a complete running programme. An engine and



A "wagon repair depot" formed of two Hornby-Dublo Engine Sheds. Note the engine and brake van passing down the main line on the way to pick up a train.

a few wagons are all the stock necessary and with them a great deal of fun can be had.

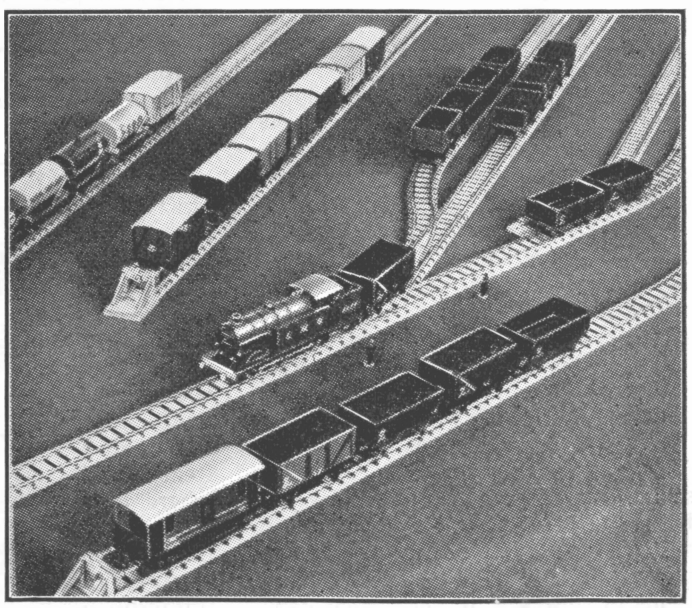
Readers often ask whether shunting operations can be carried out successfully with Dublo Clockwork Locomotives. Actually they can provided that care is taken in the management of the engines. A fully or nearly fully wound engine naturally has more "vim" than one that is well run down and will tend to be too boisterous in moving two and three wagons in and out of the sidings. The method to be employed therefore is to wind the engine just sufficiently for each movement to be made. This sounds difficult but actually it is not so; patience is necessary, as we have often pointed out when recommending this scheme of working clockwork engines. Once the amounts of "wind" to be given for the various movements with different numbers are found, they can be noted down. With practice however the operator usually finds that he can remember the requirements of his engine and "drive" it accordingly. This winding up is not noticed very much; critical onlookers are usually too fascinated by the engagement of the automatic couplings with which all Hornby-Dublo Locomotives and Rolling Stock are provided to see whether the shunting engine is wound up once or several times. Handling of the engine is necessary in any case when reversing.

Some operators uncouple their engines and wagons literally "by hand" but an improvement is to make use of that useful accessory the Hornby Shunters' Pole. Gently handled the hook of this can be made to separate the couplings of adjacent vehicles, the hook being inserted between the two coupling "loops" and the Pole given a slight twist. The effect of this is to depress the lower coupling and to raise the upper one out of engagement. The uncoupled wagon or wagons are left where required and the engine and the remainder of the train draw away ready for the next movement. A deft touch is needed with the Shunter's Pole, naturally; but with practice the art is soon acquired.

At many large shunting or construction yards in real practice the railways have wagon repair shops and in addition firms that hire out wagons to private traders sometimes maintain depots where these vehicles can be attended to when necessary. It would be an interesting novelty on a Hornby-Dublo system to establish a wagon depot at a large goods yard. On the upper illustration on this page such a wagon repair depot is seen, formed of two Hornby-Dublo Engine Sheds. This gives yet another use for this building in addition to those mentioned in these pages a little while ago. If a private firm's depot is established a notice or board giving the name of the concern adds to the interest and realism of the scene as will be noted from the illustration referred to. On the "ballast" outside such a depot a few spare pairs of wheels will help to give the impression that actual maintenance work is carried on at the depot.

The Hornby-Dublo Coal Wagons, both the High-sided and the normal type, are each provided with a realistic load of coal. This of course is a dummy load that is useful for effect, but it cannot be made use of in connection with actual loading and unloading operations. Some readers make use of the Hornby Imitation Coal, which is quite good if rather large for wagon loads, but it can well be employed to add to the realistic effect in yards where coal traffic is specialised in. Coal forms a most important part of the traffic on British railways and most readers will be able to call to mind some yard in their locality where coal traffic only is handled. Coal in wagons, coal in stacks and heaps is seen everywhere and there are invariably several road vehicles loading up for distribution of household coal. For Dublo layouts where this business is carried on the various Dinky Toys Road Vehicles can be used very efficiently, as suggested in an article in these pages recently.

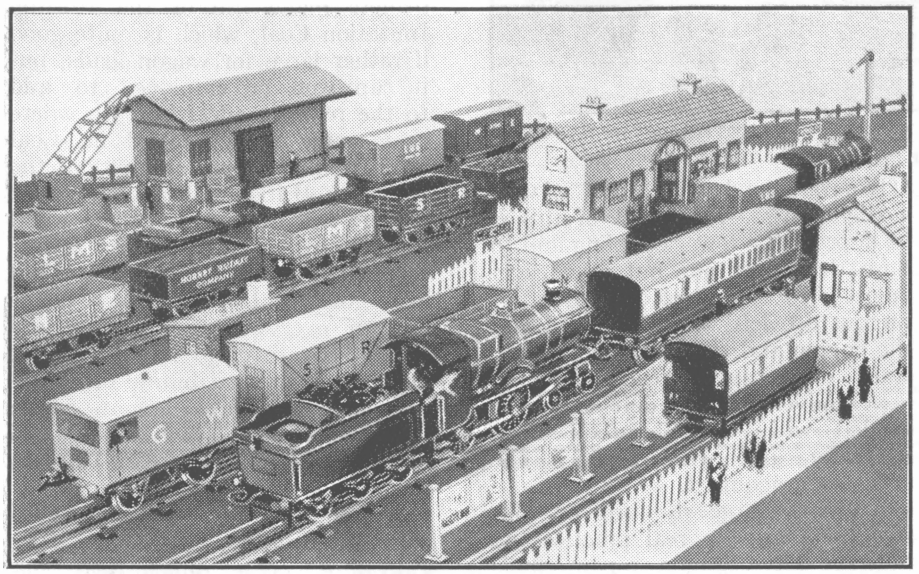
In most coal sidings, the track is laid on a level with the road, so that motor trucks and coal carts can cross over them at any point. Dinky Toys Pavement sections can be used quite effectively for this purpose, building them up on top of each other until the surface is raised to the required height, giving a realistic effect.



Shunting in progress on a Hornby-Dublo Clockwork Railway. The engine is drawing out on to the shunting spur at one end of a group of sidings.

Unusual Loads on Hornby "Specials"

THE keen miniature railway enthusiast is always trying to improve and develop his line in order to make operations on it even more attractive. This is not the only way of increasing the fun, however, and as a change to the development of the railway and its surroundings it is fascinating to try the introduction of variations in the programme of train working. Readers frequently send us details of interesting and unusual train running in which they indulge, and this article is based on some of the ideas that have been used by various miniature railway "Operating Superintendents."



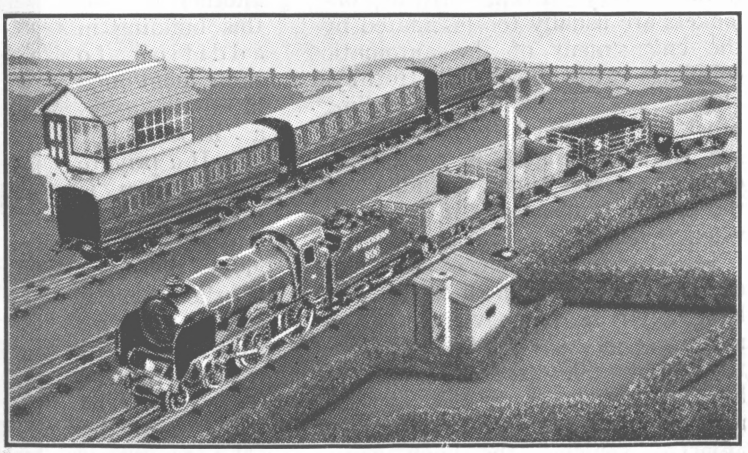
Empty coach working in miniature. A "County of Bedford," running tender first, works its train along to the carriage sidings.

One point in favour of the development of unusual or novel operations is that they require no actual alteration to the layout, being mostly connected with the trains and stock themselves. They can therefore be made use of as easily by the owners of portable model railways, who have to clear their systems away when finished with, as by those who are fortunate enough to have their railways laid down permanently.

The loading of goods wagons is frequently an early step in the scheme of improvements in operations. We have often made suggestions on this subject in these pages, for there is a variety of items in the Hornby Series that can be employed for the loading of suitable freight vehicles. Hornby Imitation Coal and the Hornby Bricks are excellent for loose loads in open wagons, and there are the different pieces of miniature luggage, particularly the hamper, in the Set. No. 1 of Railway Accessories that can be loaded into covered Vans of various types. Then there are the miniature Cable Drums and the popular Containers, both of which provide impressive loads. Container traffic in fact forms a special subject on its own that we hope to deal with in these pages in some future article.

Much can be done too with odd items such as pairs of wheels and any locomotive components that may happen to be "in stock." On most miniature railways there is an accumulation of such items, and where they are not likely to be required for immediate use they can be employed most effectively as loads. For instance, pairs of wheels loaded into an open Wagon or on a Flat Truck can represent a consignment from the "Works" of the railway to some out-station repair depot, or they can be considered as a load of railway equipment for shipment overseas. Meccano Parts also can be used, Rods in particular being effective in representing steel tubes and pipes for various purposes. They are often seen loaded "on the slope" over the end of an open wagon, or sometimes supported on the bolsters of a lumber wagon. Long loads of this kind may require a bogie vehicle and they should be supported intermediately between the bolsters by one or two pieces of strip wood of the right thickness. Pinions, Gear Wheels and similar Meccano Parts can be used also as effective loads of an engineering character.

One interesting feature of special freight working, especially under present-day conditions, is the varied types of locomotives that one sees on goods trains. Even important passenger locomotives are pressed into service on freight and even empty wagon trains in order to "Keep traffic moving." This is most convenient for the model railway owner who has, as a rule, not a great deal of choice in locomotive types; if he can reasonably use a passenger engine on a goods train, so much the better. The lower illustration on this page shows a Hornby *"Eton"* Locomotive on an empty wagon train. This is quite appropriate



A passenger engine on an empty wagon train. This unusual sight is typical of present-day operations.

An interesting group of special trains on a Hornby railway. The "special train" boards on the engines add to the realism of the scene.

nowadays, although in the ordinary way the "Schools" class would never appear on a train of this kind. In miniature "*Eton*" makes quite an impressive engine to use on a goods train; with its smoke-deflectors and route indicating discs it represents typical S.R. practice.

Even the slightly larger No. 3 type of Hornby Locomotives are much favoured by some "Locomotive Running Superintendents" for freight work on Hornby railways. Their power is an advantage where heavy trains have to be dealt with, and as far as appearances go the engines are typical of the large-boilered types in use in real practice to-day.

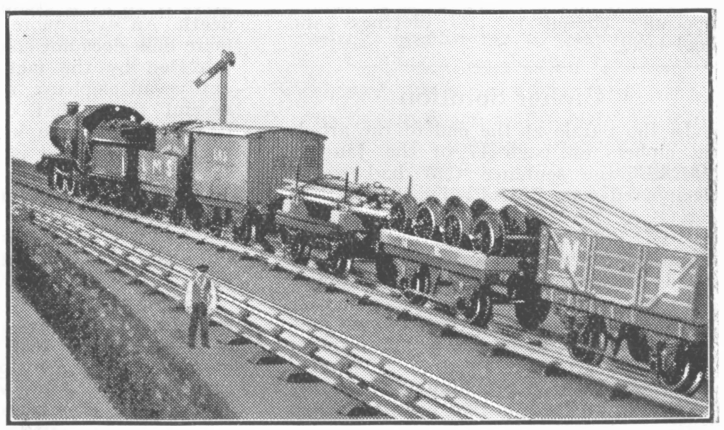
Special passenger traffic in miniature is not so spectacular perhaps as special freight, but the operation of special trains forms an interesting change from the normal routine. War conditions of course have brought into being such things as Evacuation "Specials," primarily for the movement of schoolchildren from danger areas to "safe" districts. As in peace time with intensive excursion traffic, a variety of stock is used on these trains, and sturdy mixed traffic locomotives are most favoured for their running. This suggests the use of the Hornby E120 or No. 1 Special Clockwork Locomotive with trains of No. 1 or No. 2 Coaches according to the rolling stock available.

On a railway where the stock of more than one system is in use realistic effects of "through running" can be obtained. This is particularly easy where several owners combine their miniature railway material to form one large layout as there are sure to be several different railways represented. Operating conditions on an H.R.C. Branch layout invariably are favourable to this type of working, unless the Branch layout has been specially developed to represent the practice and operations of one company only. Some of the best-known "collections" of locomotives and rolling stock belong to the occasions, in peace time, when a number of special trains are run in connection with some big sporting or other event. On a Hornby railway of course there is no need for the operator to confine himself to wartime operations. The upper illustration on this page shows a selection of trains of both L.M.S. and L.N.E.R. companies and even includes an all-Pullman special in charge of an L. N. E. R. "*Flying Scotsman.*" Such variety adds to the interest of the traffic working.

A feature that is prominent on each of the locomotives shown is the "special train" number board. This is invariably carried on the engine of a special train, especially when many such trains are being worked to one particular destination. The boards show the "Train number" as set down in the operating programme, and this allows each train to be identified readily by the staff, and by its passengers. It will be noted that different styles of marking the boards are represented, this being typical of the respective practices of the L.M.S. and the L.N.E.R. companies. The letters "SPL" on the boards carried by L.N.E.R. engines of course stand for "Special," while the practice on the L.M.S. is to show by the use of an initial letter the particular section from which the train has come. Thus "M" stands for Midland section, "W" for Western section and so on.

Miniature "boards" are easily made and lettered, cardboard or post card and Indian Ink being used. To attach the boards to the lamp brackets of Hornby Locomotives a small "loop" of brown or other stiff paper glued to the back of the board will be quite satisfactory. Alternatively two small holes pierced in the upper edge of the board will allow a small piece of cotton to be attached so that the board can be hung up on the top lamp bracket or the handle in the centre of the smoke-box door.

The storage of the empty trains until required for the return journey sometimes necessitates empty coach working away from the destination station to sidings or yards in the district. This sometimes calls for "tender first" working on the part of the engine, and some interesting sights of this kind are sometimes seen. Specials from stations near at hand are sometimes worked back to their starting points with their engines "tender first" to save turning and possible delay at the turntables and sheds. This is a method of working that may save a great deal of manœuvring on a miniature railway system.



An interesting loaded freight train. Die-cast wheels, Meccano Parts and other items make realistic and unusual loads.

Next month I hope to deal with more interesting schemes of this kind.

Hornby Trains in Argentina

The accompanying illustration shows the lively interest aroused by a special display of Hornby Trains arranged by one of our dealers in Rosario, Argentina, Sr. Manuel Moreno. The display consisted of an extensive system of Hornby Steel Track on which all operations were controlled electrically from a single point; the degree of control afforded, it is claimed, had not previously been attained in the Argentine Republic. Hornby Locomotives of all types were in use drawing trains of various kinds, both passenger and freight. In addition to the engine movements being completely controlled, special apparatus devised by Sr. Rafel Bernaben ensured the electrical operation of points and turntables, the control of a powerful crane, the automatic coupling and uncoupling of vehicles and the loading and discharge of Side-Tipping Wagons.

In addition to the usual Hornby Accessories, such as Signals and Lamp Standards, the display included also items like the Engine Shed, Goods Platforms, Loading Gauges and so on. Special attention was paid to other lineside features such as roadways and trees. The interest of the layout was such that organised parties from schools visited the system and the Foto Club made a complete film of the operations carried out on this notable system.

For the illustration and the description of the layout we are indebted to J. F. Macadam and Cia. Soc. Anon., the agents in Argentina of Meccano Ltd.

The "Banking" of Trains up Steep Inclines

(Continued from page 75)

in the empty stock assists the train out not so much from necessity as to combine the saving of a separate movement with some useful initial help. In the early days of locomotive working at Euston, however, the small locomotives then used had great difficulty in getting trains up the incline, particularly when weather was bad; but the practice then was to attach the assistant engine *in front* by means of a special slip-coupling. When the train neared the top of the gradient the leading engine was "slipped" and ran ahead into a dead-end siding, the points then being reversed between it and the train by a pointsman specially chosen for his alertness and cool head!

Cipher Solution

In the puzzle at the end of the article on ciphers on page 17 of the January "*M.M.*" the sentence that had to be deciphered was: EMRTT EESLS IYPON FKOCA YAMMA SOVTE XCHMA SDEOD SLBEO ETAMO ESNT. On counting up the letters we find that there are 54 of them, which suggests a rectangle with six letters along one side and nine along the other, say six columns and nine rows. So we write out the succession of letters in this form, reading alternately down and up in the columns. This gives us the rectangle shown in Fig. 1. It soon becomes clear that the columns have been transposed. The clue is to be found in the fourth row, where there are the letters of the words AND and THE. Suppose then that we pick out the columns that will make up the word AND in the fourth row. The easiest way to continue is then to set out the remaining three columns to give the word THE in the fourth row. The result is the rectangle of Fig. 2, and by reading the lines from left to right we get the solution: CODES TAKE MANY FORMS AND THE MOST COMPLEX MAY BE EASIEST TO SOLVE.

E	O	C	S	D	T
M	K	A	A	E	N
R	F	Y	M	O	S
T	N	A	H	D	E
T	O	M	C	S	O
E	P	M	X	L	M
E	Y	A	E	B	A
S	I	S	T	E	T
L	S	O	V	O	E

Fig. 1.

C	O	D	E	S	T
A	K	E	M	A	N
Y	F	O	R	M	S
A	N	O	D	H	E
M	O	S	T	C	O
M	P	L	E	X	M
A	Y	B	E	E	A
S	I	E	S	T	T
O	S	O	L	V	E

Fig. 2.

A Prospect of Living Longer

There is a surprising range of life in the animal world. The honey bee drone lives for only a few weeks, but the whale may continue to exist for several hundred years. The elephant also has a long span of life, ranging from 80 to 120 years, and with these examples in mind it might seem that bulk and long life go together. This is not correct, however. The turtle, which is much smaller than the whale, may live to be as old as 200 years, and popular imagination gives it an even greater age than this at death. An even more striking proof that mere bulk does not count in this respect is provided by the fact that a crow may outlive an elephant; it has a span of life several times that of the ostrich, the largest bird in the world, which is very old indeed when it is 50.

Fishes provide interesting contrasts in expectation of life. For instance, a young goldfish may look forward to swimming around for 30 years or more, but the salmon can only expect to attain an age of 15 years, and the herring two years.

Naturally the span of life, both of man and of the animal creation, has always been of great interest, and recent experiments have led to the startling prospect that it may be increased in a very simple manner. This suggestion is based on special feeding tests that have been carried out in America with white rats. To a white rat 10 days is as long as a year is to a human being, so that a rat 700 days old is as old as a man of 70. By giving these animals diets that brought them very slowly to maturity their lives have been practically doubled. The slowing down of growth by careful feeding seems to bring about a slowing down of the approach of old age.

Camouflage and Colour Blindness

A short time ago candidates for positions as observers in the United States Air Corps were flown over an area that had been well camouflaged, and told to try to pick out as many military objectives as they could. The results were disappointing, some of the candidates failing to distinguish a single object. This suggested that the camouflage was amazingly effective, but there was always the possibility that the candidates themselves were to blame. To test the matter an artillery officer who had been trained as an observer was flown over the same area, and he not only distinguished every gun position without difficulty but recognised many other military objectives as well. To complete the tests his eyesight was examined, and the astonishing discovery was then made that he was colour blind. For him camouflage was useless, as his sight enabled him to avoid the traps set by the cunning use of colours.

The episode suggests that there is room for the application of defects that for most purposes are regarded as handicaps. A colour blind observer would be handicapped by inability to recognise signal lights clearly, and in many other ways, but there is certainly room for believing that his peculiar vision could be put to good use.

The Argentine display layout described on this page. Continuous running lines encircle the whole layout, and an interesting use of the Hornby Viaduct is seen on the elevated track in the foreground.

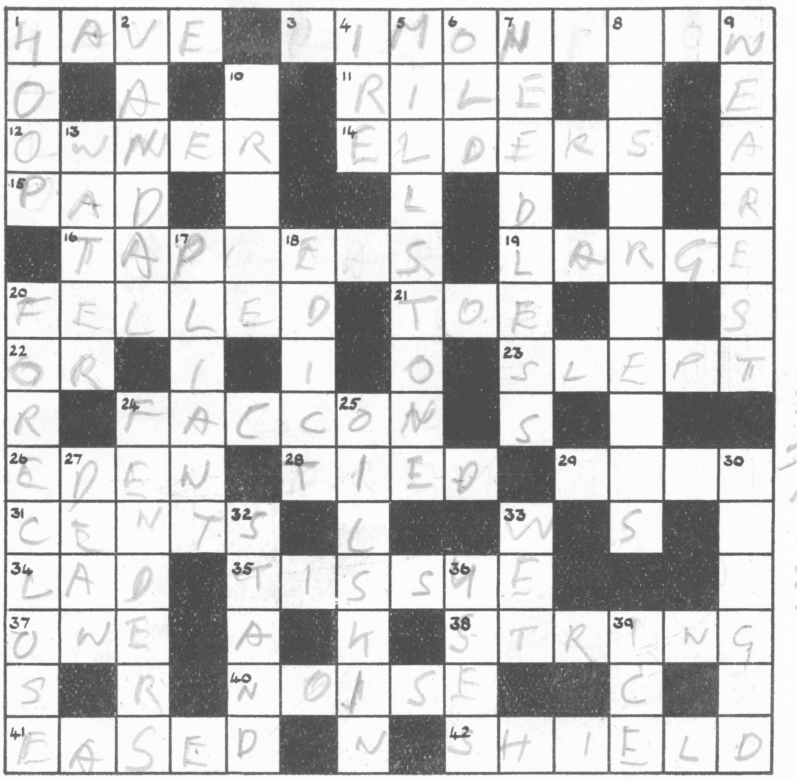
Gold in Plenty

With memories of great gold rushes and knowledge of the immense quantities of gold won from mines in South Africa, Canada and elsewhere, it may be thought that gold is getting scarcer and that the supply is running out. This is by no means correct. Experts declare that we have so far only scratched the surface, and that there are yet enormous quantities awaiting discovery. It is said indeed that in South America a "find" so incredibly rich has been made that its whereabouts are being kept secret.

One place where there must be enormous quantities of gold unworked is California, where old river channels that are probably rich in gold have been covered over by lava deposits. This area could be explored by means of drills, which are now used by prospectors in all parts of the world.

COMPETITIONS! OPEN TO ALL READERS

March Crossword Puzzle



CLUES ACROSS

1. Own.
3. Extent.
11. Annoy.
12. Possessor.
14. Ancestors, but perhaps wooden.
15. Trudge.
16. Motor car parts.
19. Great.
20. Cut down.
21. Part of the body.
22. Alternative.
23. Slumbered.
24. Bird of prey.
26. Familiar name to-day.
28. Equalled.
29. Extremely small.
31. Coins.
34. Youth.
35. String or fabric.
37. Unique.
38. Vegetable fibre.
40. Spread by rumour.
41. Made comfortable.
42. Shelter.

CLUES DOWN

1. Ring.
2. Barbarian.
4. Anger.
5. Heavy round the neck.
6. Ancient.
7. Not wanted.
8. Rebels.
9. Closest.
10. Figure of speech.
13. Necessary for life.
17. Easily bent.
18. Proclaimed by authority.
20. Take over.
24. Guards.
25. Waterproof.
27. Church dignitary.
30. Edge.
32. Rise.
33. Rainy.
36. Purposes.
39. Cover with sugar.

Entries in Crossword Puzzle Contests are always very large in number, and readers often urge us to include more crosswords. It is clear that they are popular, so here for our March Contest is one of our usual type. All the words can be found in Chambers' or any other standard Dictionary, and the clues are straightforward, so that every reader, young or old, will find the puzzle both interesting and attractive. There are two sections, Home and Overseas, and in each prizes of 21/–, 15/–, 10/6 and 5/– respectively will be sent to the readers who submit the four correct solutions that are neatest or most novel in presentation.

Entries should be addressed, "*March Crossword Puzzle*, Meccano Magazine, Binns Road, Liverpool 13." The closing date in the Home section is 31st March and in The Overseas section 31st July. Competitors must not cut out the diagram reproduced on this page. Instead, they should make a copy for use as their entry.

HORNBY RAILWAY CONTEST

Where Did This Train Run?

This month we have a novel competition in which full scope is given for the detective powers of readers as well as their knowledge of British railways. Below is given a story of a cross-country railway journey in Great Britain. In the course of this the names of the railway companies concerned are not given, and readers are asked to find these from various clues that have been introduced. Here is the story:

"My trip was a through journey involving travel over important sections of two of the big British main line railways. Over the first main part of the run I was carried in the stock of one company over the metals of the other, and the locomotive over this stretch belonged to the latter company. It was interesting to reflect that at one time the engines employed over the whole journey might easily have been of the 4-4-2 or "Atlantic" type, yet differing widely from one another in design according to the practices of their owners. As a matter of fact an "Atlantic" did take the train over the first main part of the run, but the engine was not a "native" of that section. Its cab and its wide fire-box, apart from other details, showed that it originally belonged to another section of the group over whose metals it took my train. The coaches however were characteristic of the practice of their owning railway, steel-panelled, and with the windows flush with the other sheeting.

"Immediately after starting the train passed over a notable bridge over a river famous in the ship-building world, and the first part of the run took me through colliery districts. After the first stop, too, at a cathedral city we traversed a lofty viaduct and then further coal mining areas. Then after a further halt at a place connected with one of the earliest steam railways in this country we set out on a run over a notably straight and level course on which at one time the fastest train in the British Empire used to run.

"During the first main part of the run I noted that for some distance extensive resignalling had been carried out and modern colour-lights controlled from a most up-to-date looking cab in had replaced the lower-quadrant semaphore signal characteristic of the area generally. Actually this resignalling was described in the "M.M." some time ago, and indeed an illustration of the train I travelled in appeared also more recently. The first main part of the run ended with our arrival at a most important railway centre, the station there having a magnificent curved roof and extremely long platforms.

"Soon after this stop we parted company with the main route over which we had been travelling, and ultimately branched off again on to a cross-country route of considerable importance. Then before the next stop we passed from the metals of the first company to those of the railway owning the train, though our locomotive had previously been changed at the important junction, a sturdy black-painted engine with a tapered boiler having replaced the one with which we had commenced our trip.

"A difficult section with awkward gradients lay ahead, contrasting strongly with the easy part of the run previously referred to. Soon the line pierced a notable chain of hills by means of a long tunnel which was originally driven over 100 years ago. Previous to this our progress had been controlled by another colour-light signal installation differing in principle from that passed earlier in the journey. Easing down a very sharp gradient we came to a stand at a famous station well known for its extremely long platform and again for its signalling.

"The final stage of the journey to a seaport city lay over a length of railway noted for the tightness of its schedules in days gone by. We drew up in the terminal station, where at one side electric suburban trains were accommodated. In fact for the last few miles of the run we had traversed electrified tracks."

Competitors are asked to find the names of the railway companies concerned, and also to explain the route over which the train runs, naming the starting and finishing points and the places of importance or interest passed through.

The contest is divided into the usual sections, for Home and Overseas readers respectively, and in each prizes of 21/–, 15/–, 10/6 and 5/– will be given for the four best entries in order of merit. Entries must be addressed "*Railway Journey Contest*, Meccano Magazine, Binns Road, Liverpool 13." Closing dates: Home Section, 31st March; Overseas Section, 31st

FIRESIDE FUN

WARNING

It happened at the Zoo. From the almost solid mass of people on one side of the elephant-walk there darted a small boy who paused, bun in hand, in the track of the big elephant.

Just as the animal extended its trunk to take the bun there came a harrassed voice from the crowd: "Mind, Willie . . . . . Mind 'e don't sting you!"

* * * *

Mrs. McPherson informed her husband one morning that she expected a party of guests that afternoon. He immediately rose and put all the umbrellas away.

"Why, Alec," she exclaimed, "dae ye fear that ma guests will steal yer umbrellas?"

"Nae, I'm afraid they'll recognise them."

* * * *

First Tramp: "I went there; but I dursn't go agin."

Second Tramp: "Why not? 'Fraid because of the dorg?"

First Tramp: "No, but me trowsis is!"

Second Tramp: "Your trowsis is what?"

First Tramp: "Frayed because of the dorg!"

* * * *

Mrs. Jones: "We need a new roof."

Jones: "What's the matter with the old one? It doesn't leak."

Mrs. Jones: "No, but I don't want to be ashamed every time an aeroplane flies over the house."

* * * *

An old lady sat knitting at the end of the pier, from which a pleasure steamer was about to start.

Suddenly the captain shouted "All right! Cast off now!"

The old lady looked up sharply.

"Thank you, officer," she called, "but I'm quite capable of doing my own knitting."

* * * *

A school class was engaged in the study of English grammar—particularly tenses.

"Now, Smith," said the teacher, "if I were to say, 'I have £10,000' what tense would that be?"

"Pretence!" answered the boy.

* * * *

Tom: "There goes Jake the auctioneer. He drives an awful bargain."

Dick: "Yes, I know. I was riding in it last night."

* * * *

At a village concert the audience was regaled with mineral waters by young lady helpers.

"Do you see that man on the platform who is singing has got his eyes shut?" said a facetious member of the audience to one of the young ladies.

"Yes. What is he doing that for?"

"He can't bear to look at us. He knows wot we're sufferin'!"

* * * *

A NOBLE ANIMAL

A farmer met a rag-and-bone dealer and offered to sell him a horse. The dealer inspected the horse for a few minutes, then turned to the farmer and said: "He'll do. Wot'll ye have, a flag or a balloon?"

NOT LIKELY

An old farmer came upon a man fishing by a pond near his farm.

"Any luck?" he shouted.

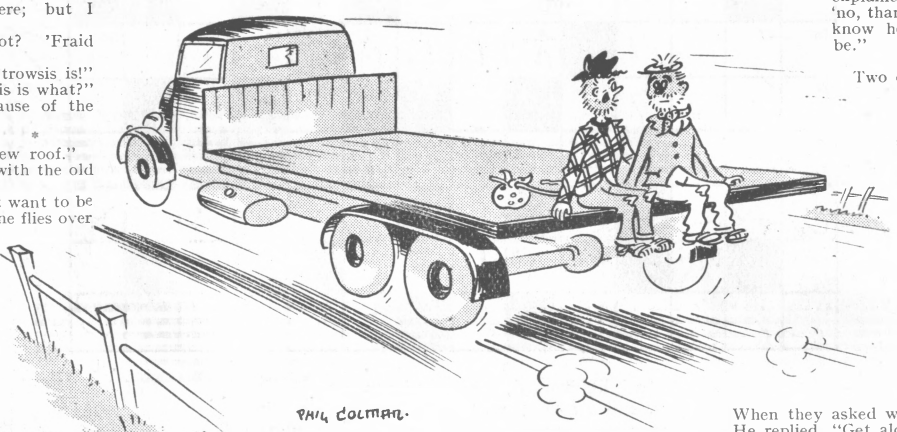
The angler shook his head. Later on in the day the farmer happened to pass that way again and saw the man still casting his line.

"Any luck?" he asked once more.

"No," muttered the fisherman. "Are there any fish at all in this rotten pond?"

"Don't rightly know," mused the farmer. "Pond weren't there yesterday!"

* * * *



"For comfort, I always choose a six-wheeler"
(By courtesy of "*The Commercial Motor*")

A large flustered woman, dragging a small boy, sailed through the station ticket barrier and approached her waiting husband.

"Hullo" said the man, "you're late."

"Oh, don't talk about it, Alf," replied his wife breathlessly. "I never 'ad such a time! What with young Bill 'anging on me 'and, me 'anging on to the luggage-rack, the train 'ung up in a tunnel, and you 'anging about in the station for me, I was in a regular state of suspense."

* * * *

At a loss for something to amuse her five-year-old daughter, a woman conceived the idea of taking her to the British Museum. A visit was paid to the mummies.

"What are those things?" the child demanded.

"Those are mummies, dear," said her mother, and she was proceeding to impart further information when she was pulled up with:

"Aren't there any daddies?"

* * * *

A farmer had a horse for sale. He wanted £80, but was offered only £50. He refused to sell.

That night the horse died, so he telegraphed the prospective buyer: "Am willing to accept your offer of £50 for horse."

He received a wire clinching the bargain. Next morning a cheque for £50 came by post, so he sent the horse by rail in the usual way.

Some days later he attended the market, steering clear of the buyer, but at length they happened to meet.

The buyer of the horse was very affable, so at last, plucking up his courage, the farmer said: "What about the horse I sold you?"

"Well," said the buyer, "unfortunately it was dead when it arrived, but I put it up to raffle. I got five men to take tickets at £20 each, and gave the winner his money back."

* * * *

THIS MONTH'S HOWLER

Letters in sloping print are called hysterics.

DISCREET

Mistress: "Marie, when you wait on the table to-night for my guests, please don't spill anything."

Maid: "Don't you worry, ma'am; I never talk much."

* * * *

Porter: "Madam, this train goes to Bristol and points West."

Madam: "Young man, I want a train to Crewe, and I don't care which way it points."

* * * *

Neighbour: "When you grow up what is your ambition, Tommy?"

Tommy: "I'd like to have people tremble like leaves at the mere mention of my name."

* * * *

She did not understand the thermometer, but she took her husband's temperature with it and then held a match under it to read it properly.

She sent a frantic message to the doctor.

"Come at once: temperature 156 degrees."

To which the doctor replied: "I can do nothing. Send for the fire brigade!"

* * * *

An income-tax collector had died and a subscription was raised in an office for a wreath. The boss promised five shillings. A few days later one of the clerks called to collect the money, and the chief handed him a 10-shilling note.

"You want five shillings change, sir," said the clerk.

"No," growled the other. "Keep it and bury another tax man."

* * * *

Jimmy declined a second helping of jelly. Pressed to change his mind he explained: "Mummy told me to say 'no, thank you,' but perhaps she didn't know how small the helpings would be."

* * * *

Two old ladies had decided to take a trip in an aeroplane.

They were about to get into the machine when one of them said to the pilot. "You will bring us back safely, won't you?"

"Oh, yes, madam," was the reply. "I've never left anybody up there yet."

* * * *

"Poppa, what's a millennium?"

"Rastus, dat is de same thing as a centennial, 'cept it's got more legs."

* * * *

There was an old fellow from Lincoln,
Whose eyes were continually blincoln.
When they asked what was wrong.
He replied, "Get along!
When I'm thincoln I can't keep from wincoln."

* * * *

The A.R.P. Warden was giving Mrs. Malaprop a few hints in case of air-raids. Afterwards he asked if what he had explained was quite clear to her.

"Yes, sir," she replied. "But it's going to be a sticky business using that there syrup pump!"

* * * *

A young man who was anxious to learn swimming made little progress owing to his panic in deep water.

"You know," suggested the instructor helpfully, "you ought to get a pair of wings."

"I expect I s-shall," panted the beginner as he clung desperately to the side of the bath, "and a h-h-harp as well, old boy."

* * * *

The golfer lost his ball and, not unnaturally, was inclined to be annoyed with his caddy.

"Why didn't you watch where it went?" he asked.

"Well, sir," said the boy, "it don't usually go anywhere, and so it took me unprepared like."

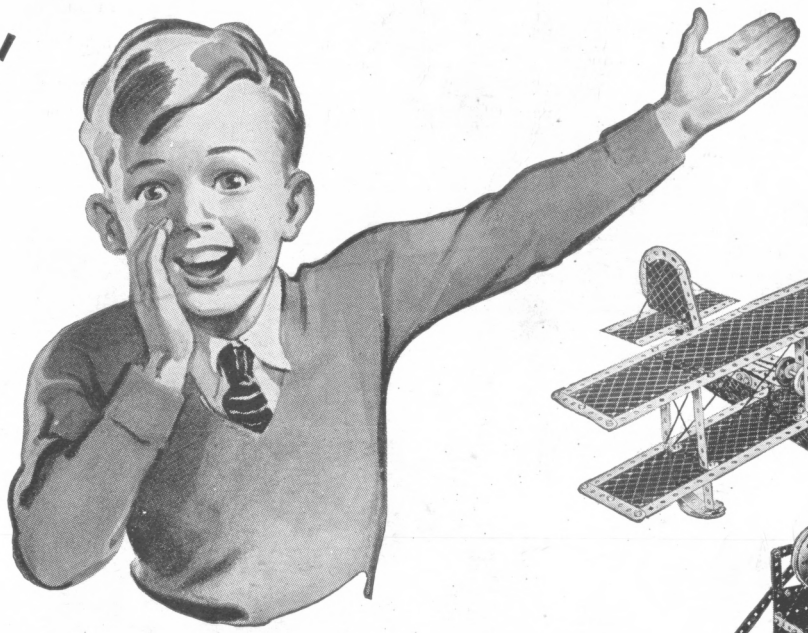
* * * *

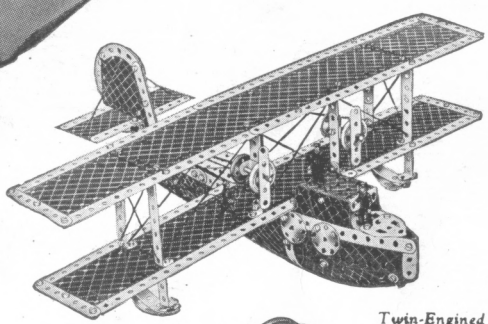
A FREE GIFT!

Teacher: "Johnny, give me what you've got in your mouth!"

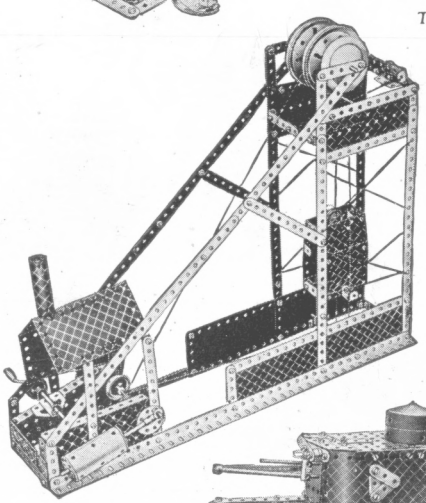
Johnny: "I'd like to, miss. It's a toothache!"

THE KING OF INDOOR HOBBIES

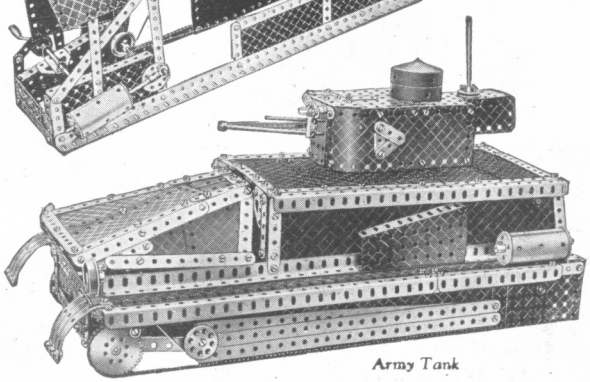




Twin-Engined Flying Boat



Pit Head Gear



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